

# PROCEEDINGS

OF THE

## Biological Society of Washington

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VOLUME 48

1935

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WASHINGTON  
PRINTED FOR THE SOCIETY

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### PUBLICATION NOTE

By a change in the By-Laws of the Biological Society of Washington, effective March 27, 1926, the fiscal year now begins in May, and the officers will henceforth hold office from May to May. This, however, will make no change in the volumes of the Proceedings, which will continue to coincide with the calendar year. In order to furnish desired information, the title page of the current volume and the list of newly elected officers and committees will hereafter be published soon after the annual election in May.

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(FOR 1935-1936)

(ELECTED JUNE 1, 1935)

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\*Deceased.



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The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The table of contents, minutes of meetings, and index for 1935 (pp. v-xii; 211-226) were issued on February 4, 1936. The title page and lists of officers and committees for 1935-1936 (pp. i-iv) were issued on August 22, 1935.

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PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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PROCEEDINGS.

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The Society meets from October to May, on alternate Saturdays, at 8 P. M. All meetings during 1935 were held in the new lecture hall of the Cosmos Club, except the meeting of May 28, held jointly with the National Park Service in the auditorium of the Department of the Interior, and the special meeting of June 1, held jointly with the Audubon Society of the District of Columbia at the National Zoological Park.

**January 12, 1935—810th Meeting.**

President Chambliss in the chair; 95 persons present.

*Informal communications:* T. S. Palmer, Note on the award of the Leidy Memorial Medal, and Note on 1935 centennials of ornithologists; W. B. Bell, Note on field work of E. A. Goldman; F. C. Lincoln, Note on an expedition by A. A. Allen to record bird notes and habits by cameras and sound recording apparatus; V. Bailey, Note on records of sharp-tailed grouse, and Note on the use of beavers to check erosion; H. P. Barss, Note on the A.A.A.S. meeting at Pittsburgh; F. C. Bishopp, Note on the A.A.A.S. meeting; I. N. Hoffman, Exhibition of a work on animals; J. S. Wade, Exhibition of recent books.

*Formal communications:* S. F. Hildebrand, Fishes of the District of Columbia and vicinity; E. C. McKee, Effects of certain ecological factors of the Grand Canyon on plant and animal life.

**January 26, 1935—811th Meeting.**

President Chambliss in the chair; 58 persons present.

*Informal communications:* C. Cottam, Note on the 21st American Game Conference; R. B. Horsfall, Note on antelopes at the National Zoological Park; T. Ulke, Note on habits of animals at the National Zoological Park; F. Thone, Exhibition



of recent books; A. S. Hitchcock, Exhibition of Arber's "The Gramineae."

*Formal communications:* A. S. Hitchcock, Grasses of the District of Columbia and vicinity; M. K. Brady, Reptiles and amphibians of the District of Columbia and vicinity.

**February 9, 1935—812th Meeting.**

President Chambliss in the chair; 80 persons present.

New members elected; C. R. Crosby, P. W. Oman, J. A. Stevenson, Alan Stone.

*Informal communications:* H. B. Humphrey, Biographical sketch of Albert Mann; T. S. Palmer, Biographical sketch of David White; J. R. Sarton, Exhibition of an alligator; Robert Crandall, Exhibition of a collection of minerals; T. Ulke, Exhibition of specimens of Cupressinoxylon; J. A. Stevenson, Note of the occurrence of various fungi on the Washington Monument; M. B. Waite, Note on the habits of foxes; V. Bailey, Note on the hibernation of a bat.

*Formal communications:* F. L. Mulford, Exotic trees and shrubs of the District of Columbia and vicinity; H. C. Bryant, Hibernation of bears in Yellowstone Park.

**February 23, 1935—813th Meeting.**

President Chambliss in the chair; 70 persons present.

New members elected: W. H. Krull, B. A. Porter.

*Informal communications:* W. T. Swingle, Note on a phytogeographic survey of the Sonoran Basin; R. K. Beattie, Note on experiments on the transportation of Dutch elm disease spores by air currents; J. S. Wade, Exhibition of recent books; T. S. Palmer, Note on feeding of quail during the winter.

*Formal communications:* J. A. Stevenson, Parasitic fungi of the District of Columbia and vicinity; C. Cottam, The eel-grass disease; S. P. Young, Wolfing with a camera.

**March 9, 1935—814th Meeting.**

President Chambliss in the chair; 240 persons present.

New member elected: Louise Russell.

*Informal communications:* Phoebe Knappen, Note on the history of the love bird in captivity; J. E. Shillinger, Note on the causes of mortality in animals in zoological parks; T. S. Palmer, Biographical sketch of D. G. Elliot; F. Thone, Exhibition of recent books.

*Formal communications:* J. E. Benedict, Jr., The ferns of the District of Columbia and vicinity; F. C. Craighead, Jr., J. J. Craighead, and Robert Stevenson, Catching and training hawks for hunting.

**March 23, 1935—815th Meeting.**

President Chambliss in the chair; 140 persons present.

New members elected: Raymond Pearl, D. B. Young.

*Informal communications:* T. Ulke, Exhibition of a scaly salamander; A. S. Hitchcock, Note on study of tree buds; Phoebe Knappen, Note on the eating of buds by squirrels and English sparrows; V. Bailey, Exhibition of a hibernating specimen of big brown bat.

*Formal communications:* A. H. Howell, Habits and distribution of the American Arctic hares; National Parks of Canada, moving pictures entitled The whistling swan, The trumpeter swan, The beaver people, Gray Owl's neighbors, Hunting without a gun, and The home of the buffalo.

**April 6, 1935—816th Meeting.**

President Chambliss in the chair; 85 persons present.

New members elected: J. W. Bailey, G. E. Blandford, Jr., E. J. Court, F. C. Craighead, Jr., J. J. Craighead, J. B. Egerton, F. S. Haydon, W. G. Lynn, R. B. Overington, Florence T. Simonds, R. T. Stevenson.

*Informal communications:* J. S. Wade, Exhibition of recent books; Fish and Game Commission, New Jersey, Bird dogs in action and Trout fishing (motion pictures).

*Formal communications:* W. R. Chapline, Forestry fosters new approaches to watershed conservation; E. H. Walker, Some problems and methods in the taxonomic study of Chinese plants.

**April 20, 1935—817th Meeting.**

President Chambliss in the chair; 95 persons present.

New members elected: W. L. Doyle, G. B. Moment, Donald Scott, R. B. Wallace, P. A. Woke.

*Informal communications:* E. P. Walker, Note on the habits of a captive aardvark; T. S. Palmer, Note on the exhibition of Audubon's works at the Library of Congress; F. Thone, Exhibition of recent books; J. S. Wade, Exhibition of recent books; I. N. Hoffman, Exhibition of insects; Elie Cheverlange, Exhibition of animal pictures.



*Formal communications:* F. C. Lincoln, How and why of bird banding; S. F. Blake, The autumn flowers of the District of Columbia and vicinity; J. C. Bridwell, Wasps of the District of Columbia and vicinity.

**May 4, 1935—818th Meeting.**

President Chambliss in the chair; 125 persons present.

New member elected: W. E. Bullington.

*Informal communications:* T. S. Palmer, Note on the discovery of hitherto unknown editions of Mrs. St. John's Life of Audubon; H. B. Humphrey, Note on a dust storm due to oak pollen; Phoebe Knappen, Note on the bluebird.

*Formal communications:* H. M. Smith, Some aspects of Siamese zoology; M. C. Hall, Application of military principles to the control of animal parasites.

**May 18, 1935—819th Meeting.**

President Chambliss in the chair; 70 persons present.

New members elected: J. E. Alicata, L. A. Jackowski, E. D. Merrill, C. J. Pierson, Beverly Rogers.

*Informal communications:* V. Bailey, Note on the recent meeting of the American Society of Mammalogists; T. Ulke, Exhibition of a new bee host of a meloid beetle; Phoebe Knappen, Note on night observations of birds at the Washington Monument; E. P. Walker, Note on the presence of a sawfly on ash trees; J. S. Wade, Exhibition of recent books; C. E. Chambliss, Exhibition of scissors silhouettes of animals.

*Formal communications:* Alan Stone, Diptera of the District of Columbia and vicinity; G. S. Myers, Tropical freshwater fishes; R. B. Wallace and Richard Higgins, Breeding of small tropical fishes in aquaria.

**May 28, 1935—820th Meeting,**

President Chambliss in the chair; 300 persons present.

Joint meeting with National Park Service.

*Formal communication:* Wendell Chapman, Rocky Mountain mammals (still and motion pictures).

**June 1, 1935—Special Meeting.**

A picnic-luncheon was held jointly with the Audubon Society of the District of Columbia at the National Zoological Park, with 100 persons present.

**June 1, 1935—821st Meeting.  
56th Annual Meeting.**

President Chambliss in the chair; 14 persons present.

New members elected: H. H. Collins, Jr., A. W. Herre.

The reports of the Recording Secretary, Corresponding Secretary, and Treasurer were read. Reports were presented for the Committee on Publications, Committee on Zoological Nomenclature, and Board of Trustees of the Permanent Fund.

The following officers and members of council were elected: *President*, Chas. E. Chambliss; *Vice-President*, C. W. Stiles, H. C. Fuller, T. H. Kearney, W. B. Bell; *Recording Secretary*, S. F. Blake; *Corresponding Secretary*, J. S. Wade; *Treasurer*, F. C. Lincoln; *Members of the Council*, W. R. Maxon, A. A. Doolittle, I. N. Hoffman, E. P. Walker, J. E. Shillinger.

**October 19, 1935—822d Meeting.**

President Chambliss in the chair; 45 persons present.

*Informal communications*: F. Thone, Exhibition of new biological publications; E. P. Walker, Note on rare animals at the National Zoological Park.

*Formal communications*: E. P. Killip, The Tri-centennial of the Paris Natural History Museum and the Sixth International Botanical Congress; C. W. Stiles, Preliminary news from the International Zoological Congress at Lisbon; Watson Davis, micro-photographic duplication of scientific documents.

**November 2, 1935—823d Meeting.**

President Chambliss in the chair; 75 persons present.

New members elected: J. W. Aldrich, B. P. Bole, Jr., Frederick Dunlap, L. E. Hicks, Neil Hotchkiss, Ernest Lancaster-Jones, F. H. Kreeker, J. P. E. Morrison, A. I. Ortenburger, R. H. Peebles, H. A. Rehder, J. R. Swallen, G. M. Wright.

*Informal communications*: C. W. Stiles, Observation of clouds of white cabbage butterflies in Florida; E. P. Walker, Notes on new arrivals at the National Zoological Park; J. S. Wade, Note on the 31st annual meeting of the National Association of Audubon Societies.

*Formal communications*: T. S. Palmer, The 53d annual meeting of the American Ornithologists' Union; Malcolm Davis, Courtship display of the flightless cormorant; Willis King, Reptilian

and amphibian ecological relationships in the Great Smoky Mountains.

**November 16, 1935—824th Meeting.**

President Chambliss in the chair; 50 persons present.

New members elected: H. E. Allanson, P. W. Bowman, F. L. Goll, L. E. Griffin, Annie M. Hurd-Karrer, Irene de Poplanska-Leineweber, André D. Pizzini, F. A. Riedel.

*Informal communications:* Annie L. Davis, Note on a bird refuge in the palace grounds at Tokyo; H. B. Humphrey, Notes on the habits and growth of the timber rattlesnake; T. Ulke, Note on fossil algae in the steps of the Baptist Church; T. S. Palmer, Notes on the vampire bat and the false vampire; S. F. Blake, Exhibition of The Potomac Trail Book.

*Formal communications:* P. H. Roberts, The Shelter Belt Project; E. P. Walker, "Bobbitee" and "Bittie," *Perognathus pacificus*, in personal appearance; J. S. Wade, Discussion of recent books of biological interest.

**November 30, 1935—825th Meeting.**

President Chambliss in the chair; 150 persons present.

New member elected: D. G. Hall.

*Formal communications:* Alice L. Brown, Hereditary evidence of a spiral force in development—comparative studies on mouse, chick, and black skimmer embryos; J. A. Stevenson, Fungus prodigies; F. C., Jr., and J. J. Craighead, Motion pictures of hawks, owls, and ravens.

**December 14, 1935—826th Meeting.**

President Chambliss in the chair; 65 persons present.

New members elected: G. F. Baggle, Morgan Berthrong, V. H. Cahalane, J. F. Couch, Julian Griggs, Lawrence Huffty, W. H. Orsinger.

The death of M. T. Donoho was announced.

C. E. Chambliss was nominated as vice-president of the Washington Academy of Sciences.

*Informal communication:* Hugo Darling, Note on a method of giving popular talks on science in the schools of Philadelphia.

*Formal communications:* E. R. Kalmbach, The crow-duck relationship on Canadian breeding grounds; Donald Libby, Carbonized wood deposits of Crater Lake National Park; C. E. Chambliss, Wild rice of the District of Columbia.

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PROCEEDINGS  
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PRELIMINARY DESCRIPTIONS OF SEVEN NEW  
SPECIES OF OXYSTOMATOUS AND ALLIED  
CRABS.

BY MARY J. RATHBUN.<sup>1</sup>

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Fuller descriptions of the following species will appear in a Bulletin of the United States National Museum. With the exception of the first species, all were taken by the Hancock Galapagos Expedition.

FAMILY RANINIDAE.

**Raninoides benedicti**, sp. nov.

*Raninoides laevis lamarcki* BOONE, Bull. Vanderbilt Mar. Mus., vol. 2, 1930, p. 48 (part), pl. 9, fig. B.C.—Not *R. l.* var. *lamarcki* Milne Edwards and Bouvier, 1923.

*Type*.—Male, U. S. National Museum Cat. No. 57685, off La Paz Bay, Mexico, 26.5 fathoms; *Albatross* station 2823. Inner angle of outer frontal tooth not spiniform. Propodus of cheliped  $2\frac{1}{2}$  times as long as wide. Proximal margin of fixed finger forming a right angle with margin of palm; distal margin forming much more than a right angle with margin of palm. A spine at base of mobile finger, 4 spines on lower margin of manus, two spines on carpus, one spine at distal end of merus. Length of carapace 35.2, width at middle 16.3 mm.

**Raninoides ecuadorensis**, sp. nov.

*Type*.—Male, U. S. National Museum Cat. No. 69319, La Plata Island, Ecuador, 45-55 fathoms; station 212. Carapace widest at middle; anterior end roughly granulate; a well marked lateral tooth on rostrum; one curved lateral spine on carapace. Merus of cheliped unarmed, carpus bidentate, manus with 3 long slender spines below, no spine at base of movable finger. Length of carapace 20.1, width 11.6 mm.

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## FAMILY DORIPPIDAE.

***Clythrocerus laminatus*, sp. nov.**

*Type*.—Male, U. S. National Museum Cat. No. 69221, Wenman Island, Galapagos Islands, 100–150 fathoms; station 143. Carapace wider than long, flat, finely granulate, with one lateral spine and without marginal indentations. Front with 2 teeth. Carpus of cheliped much broader than long; a large, blunt, triangular tooth on outer surface; a more prominent, rectangular plate projecting inward from inner surface. Length of carapace 4.5, width 5 mm.

## FAMILY LEUCOSIIDAE.

***Ebalia clarionensis*, sp. nov.**

*Type*.—Male, U. S. National Museum Cat. No. 69343, Sulphur Bay, Clarion Island, Mexico, 32 fathoms; station 136. Carapace octagonal, surface covered with crowded punctae; a small median hollow on cardiac region; no marginal teeth at widest part of carapace; a low inconspicuous crest on last three articles of chelipeds. Length of carapace 6.3, width 6.7 mm.

***Randallia minuta*, sp. nov.**

*Type*.—Male, U. S. National Museum Cat. No. 69745, Puerto Culebra, Costa Rica; dredging around isles in bay; Feb. 25, 1934; station 257. Carapace coarsely granulate except in the depressions between regions and on the front and hepatic region. These last are elevated and nearly smooth; the cap over the front has two teeth projecting forward and two backward which are directly behind the front teeth. The hepatic region is covered by a round flat plate. Two small shallow lobes on posterior margin and an equally small but more pointed lobe on postero-lateral margin. Length of carapace 4 mm., width 4.2 mm.

***Iliacantha hancocki*, sp. nov.**

*Type*.—Male, U. S. National Museum Cat. No. 69260, Santa Maria Bay, Lower California, 35–40 fathoms; station 281. Carapace with a narrow produced front; median spine of posterior margin  $1\frac{1}{2}$  times as long as lateral spines. Pterygostomian border rounded, not angular. Chelipeds twice as long as carapace; palm and movable finger subequal in length. Length of carapace without posterior spine 23.4, width 20.6 mm.

***Iliacantha schmitti*, sp. nov.**

*Type*.—Ovigerous female, U. S. National Museum Cat. No. 69259, Gorgona Island, Colombia, 150 fathoms; station 220. Rostrum prominent, with two triangular acute teeth convex from side to side and from front to back, overreaching the eyes and deeply separated from each other by a triangular sinus. Posterior margin beneath the median spine, transverse, visible from above, slightly convex in outline and with a large, flat, triangular tooth at either end. Fingers  $1\frac{1}{2}$  times as long as palm. Length of carapace excluding spine 31, width 28.8 mm.

FAMILY CALAPPIDAE.

***Osachila galapagensis*, sp. nov.**

*Type*.—Female, U. S. National Museum Cat. No. 69215, Wenman Island, 100–150 fathoms; station 143. Dorsal surface wholly eroded; cardiac elevation rounded behind; a pair of tubercles at the anterior as well as the posterior corners of the cardiac region. Antero-lateral margin with sharp denticles. Rostrum thick, bilobed. Sides of terminal segment of female abdomen curved outward. Length of carapace 20.6, width 24.7 mm.



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A NEW PHALLOSTETHID FISH FROM PALAWAN.

BY GEORGE S. MYERS.

---

Among the fishes obtained by the U. S. Fisheries Steamer "Albatross" in the Philippines in 1907-1910 were several Phallostethids. One of them, representing a very distinct new genus, is described below.

**PLECTROSTETHUS**, new genus.

*Genotype*.—*Plectrostethus palawanensis*, new species.

Toxactinium absent. An oval pulvinulus, smaller than the eye and free around its entire margin, is present just posterior to the prominent keel of the axial bone. A single smooth ctenactinium, not greatly curved, with a broad membranous margin along the lower side of its proximal half. At its base, the folded ctenactinium covers a flat fleshy process armed on its upper and posterior border with a row of 9 or 10 short sharp recurved spines; on its anterior border the process bears two longer spines, directed forward.

Anal fin moderate in length. Nape and opercles naked. First dorsal of 2 rays. Lower jaw weak and partly included within the upper. Teeth in a single series, recurved. A thin, naked fleshy keel along belly.

**Plectrostethus palawanensis**, new species.

*Holotype*.—U. S. N. M. 93421, a left adult male, 23 mm. standard length (28 mm. total), seined by a shore party from the U. S. S. "Albatross" at the mouth of the Caiholo River, Ulugan Bay, west coast of Palawan, Dec. 29, 1908.

*Allotype*.—U. S. N. M. 93422, a female 19.5 mm. standard length (22.5 mm. total), same locality and date.

*Paratypes*.—U. S. N. M. 93423, ten specimens, same locality and date.

First dorsal 2, inserted directly above base of tenth anal ray. Second dorsal  $5\frac{1}{2}$ , inserted over base of last anal ray. Anal  $15\frac{1}{2}$ . Caudal 6-16-7. Scales 30 to 32 from upper end of gill slit to tip of hypural; 7 in a transverse series from mid-dorsal scale row to ventral keel. Body very slender, its greatest depth 7.66 times in standard length, its axis not angulated. Head very small, 5.75 in standard length. Least depth of caudal peduncle 11.5,



snout tip to anal origin 1.87, and second dorsal origin to hypural end 3.83 in standard length. Eye 2.20 in head.

This little fish is closely related to *Neostethus*, from which it differs trenchantly in the presence of the spine-bearing process of the priapium and in the wing-like margin of the ctenactinium.

The Phallostethidae, first made known by Regan (*Ann. Mag. Nat. Hist.*, (8) XII, 1913, p. 548; *Proc. Zool. Soc. London*, 1916, p. 1) as Cyprinodonts and lately placed in the order Percosoces by the present writer (*Amer. Mus. Novit.*, No. 295, 1928, p. 4), diverge widely from any of their supposed relatives in the remarkable and complex priapium of the male. I venture, therefore, to propose for them a new suborder, *Phallostethoidea*, to rank with the Mugiloidea and Polynemoidea in the Percosoces.

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FOUR NEW FRESH-WATER FISHES FROM BRAZIL,  
VENEZUELA AND PARAGUAY.

BY GEORGE S. MYERS.

---

Two Cyprinodonts, a Callichthyid catfish and a genus of Cichlids are herewith described as new from the collections of the United States National Museum. It will be noted that two of the new forms are based on aquarium specimens without accurate locality. Several of the many aquarium fishes that have recently been brought into New York from Manáos and Pará seem to be unknown but I have hesitated to describe them because of the difficulty or impossibility of obtaining exact locality data. The present two species, however, seem to be so well-marked (one of them represents a new genus) that there can be no great objection to naming them from the material at hand, especially since we can be fairly certain of the general area from which they came.

***Pterolebias zonatus*, new species.**

*Holotype*.—U. S. N. M. 92190, an adult female with eggs, 35 mm. standard length, from a pond in the estate of Guarico, Orinoco Basin of Venezuela, collected in 1928 by a representative of the International Health Board of the Rockefeller Foundation as a fish of value in mosquito control.

The single specimen of this fish was received in the same lot which included the type of *Austrofundulus transilis* Myers (*Proc. Biol. Soc. Washington*, vol. 45, 1932, p. 159<sup>1</sup>). It appears to be similar to *Pterolebias longipinnis* Garman (*Mem. Mus. Comp. Zool.*, vol. 19, no 1, 1895, pp. 141,

<sup>1</sup> It should be noted that the "*Fundulus spec. ? aus Venezuela*" reported by Ladewig which I mentioned in connection with *Austrofundulus*, was later found not to be a Venezuelan fish. I was able to purchase a pair of the offspring of Ladewig's fish through the assistance of Mr. Hugo Weise of Braunschweig, editor of the *Wochenschrift für Aquarien- und Terrarienkunde*. These two specimens, now U. S. N. M. 94217, were bred from a pair collected by Dr. R. Oeser of Berlin at Finca del Rosario (1000 meters altitude), Bola de Oro, Pacific slope of Guatemala, in January, 1932. They are *Profundulus punctatus* (Günther).

142, Santarem; Myers, *Ann. Mag. Nat. Hist.*, (9) vol. 19, 1927, p. 117 and footnote) in the greatly compressed caudal peduncle, and the attenuate pelvic fins. It appears to differ chiefly in the more anterior dorsal position, the slightly higher anal count, and the dark vertical stripes on the side.

Body considerably compressed, especially the caudal peduncle, but the abdomen is considerably distended with eggs. Dorsum flattened, the profile moderately convex to the very posterior dorsal fin which originates above the base of the fourteenth anal ray or about three times as far from the vertical of the snout tip as from the vertical of end of hypural. Fins mostly so broken that their length can not be given but it is evident that the anterior anal rays are long, possibly as long as the head, and the comparatively uninjured pelvics extend at least as far as the base of the eleventh anal ray. A small patch of teeth on the head of the vomer.

Dorsal badly broken, count probably about 10. Anal 22. Pectoral 13. Scales lateral 34, plus a few on caudal base; transverse from mid-dorsal series to anal origin 12; predorsal scales irregular, about 28 or 29 to above pupil; 16 around caudal peduncle.

*Measurements of holotype in millimeters.*—Standard length 35.0. Depth 11.0. Head 10.8. Eye 3.2. Interorbital (not bony) 4.5. Snout 3.0. Width of preorbital 0.5. Thickness of body (abdomen) 7.0. Least depth caudal peduncle 5.5. Length caudal peduncle (vertical dorsal base end to vertical hypural end) 6.3. Vertical of snout tip to vertical dorsal origin 26.0. Length pelvics 7.6.

Color in alcohol dull yellowish brown, with 11 narrow dark vertical bars along the sides, the last on the caudal peduncle. Caudal fin with small blackish spots.

#### ***Neofundulus ornatipinnis*, new species.**

*Rivulichthys rondoni* (nec Miranda-Ribeiro) Carter and Beadle, *Journ. Linn. Soc.*, London, (Zool.) vol. 37, 1931, pp. 329, 330, 339 (Makthlawaiya).

*Holotype*.—U. S. N. M. 94401, a male, 38 mm. standard length, from swamp at Makthlawaiya, Paraguayan Chaco (23° 25' S., 58° 19' W., about 60 miles to the West of the Rio Paraguay); collected by Dr. G. S. Carter and Mr. L. C. Beadle, 1926–1927; received by exchange from the British Museum (Natural History).

I place this species in *Neofundulus* (see Myers, *Ann. Mag. Nat. Hist.*, (9) vol. 19, 1927, pp. 116–118) with considerable hesitation. Its fin counts are higher than those of *N. paraguayensis*, agreeing more closely with those of *Cynopoeilus melanotaenia*. In fact the only thing that prevents placing *ornatipinnis* in *Cynopoeilus* is the compressed form of the latter. It would seem that, for the present, the body form alone must constitute the sole distinguishing feature of *Neofundulus*. *N. ornatipinnis* is much more like *paraguayensis* than *C. melanotaenia* in general appearance and form. In describing the new form I have been fortunate in having at hand the holotype of *N. paraguayensis* for direct comparison, as well as an example of *C. melanotaenia*. In giving each measurement and count of *ornatipinnis*, I have placed the corresponding figure for *paraguayensis* immediately

after, in parenthesis.<sup>2</sup> It may be remarked that the new species has little similarity to *Rivulichthys rondoni* (see Myers, *loc. cit.*, 1927) which has a posteriorly placed dorsal fin (originating over the ninth anal ray) and a widely different fin count (dorsal 9, anal 15).

Dorsal and anal origins almost opposite, the dorsal originating over the base of the second or third anal ray, exactly as in *paraguayensis*. Body rather slender, much more delicately formed than in the thick-set, robust *paraguayensis*. Pelvic fins placed much as in *paraguayensis*, their bases separated by a very slight interspace. Caudal peduncle longer, dorsal and anal rays more numerous, body more slender, and scales smaller than in *paraguayensis*.

Dorsal 15 (broken in *paraguayensis*, probably 12). Anal 18 (14). Caudal 5-18-5 (3-18-3). Pectoral 14 (13). Pelvics 7 (6). Scales lateral 37 (34) plus several on caudal base in each species; transverse from dorsal origin to anal origin  $\frac{1}{2}$ -11- $\frac{1}{2}$  ( $\frac{1}{2}$ -10- $\frac{1}{2}$ ); predorsal to above pupil 31 (26), in each case the number being only approximate due to injury; around caudal peduncle 20 (16). Vomerine teeth present in both species. Gill-rakers 10 (8). Branchiostegals 5 (not counted in *paraguayensis* due to injury).

*Measurements in millimeters.*—Standard length 38.0 (44.5). Total length 47.0 (57.0). Depth 8.5 (11.5). Head 10.0 (12.0). Eye 3.0 (4.0). Interorbital (not bony) 4.75 (5.0). Snout 2.3 (3.6). Width preorbital 0.5 (0.7). Greatest thickness of body (opercular region) 7.0 (9.0). Least depth caudal peduncle 5.0 (6.5). Length caudal peduncle (vertical of end or dorsal base to vertical of end of hypural fan) 5.3 (5.6). Vertical of snout tip to vertical of dorsal origin 26.0 (32.0). Length pectorals 9.5 (11.0). Length pelvics 5.0 (5.3).

Body plain light brownish, paler on belly. A conspicuous, black, vertically elongated humeral spot just behind and somewhat above base of pectoral fin. Dorsal nearly clear basally, rest of fin marked with three series of brown spots on the membrane between the rays, the outer series near the edge of the fin. Caudal plain dusky. Anal dark at the base, this being followed in outward succession by a wide clear stripe, a dark line formed of a series of brown spots on the membrane between the rays, and a broad brownish edging to the fin. The brown edging takes up nearly half the height of the anal, and a short distance out from the series of brown spots this marginal brown is faintly aggregated into another such series of spots. Pelvics almost clear. Pectoral with several irregular series of brown spots crossing the fin on the membranes.

In *paraguayensis* the body color is brownish. Four dark brown ill-defined longitudinal streaks running forward from the caudal base and fading a little before the dorsal and anal origins. These stripes make the lighter ground color between them look like light lines. The caudal is not pale dusky, but is boldly marked with irregular series of brown spots. Other fins marked much as in *ornatipinnis*. There is no humeral blotch in *paraguayensis*.

<sup>2</sup> My observations do not coincide in many points with Eigenmann and Kennedy's original description of *Fundulus paraguayensis* (*Proc. Acad. Nat. Sci. Philadelphia*, 1903, p. 530).



***Corydoras leopardus*, new species.**

*Holotype*.—U. S. N. M. 93305, 41 mm. standard length; Brazil (probably the Amazon or one of the coastal streams immediately to the south); collected in 1933 by Karl Griem; received from Mr. Richard Büttner of New York.

*Paratype*.—U. S. N. M. 93306, 23 mm. standard length; same data.

A *Corydoras* very close to *C. trilineatus* Cope (*Proc. Acad. Nat. Sci. Philadelphia*, vol. 23, 1871, p. 281, pl. 6, fig. 2a-2c; Ambyiacu River) in structural features and color pattern, but differing in the greater depth of the adult; the presence of four instead of two azygous plates in front of the adipose fin; the smaller eye; the longer snout; the presence of a conspicuous dense mottling of small blackish spots over the upper two-thirds of the body, as well as on the head, cheeks and snout; the different shape and position of the black blotch on the dorsal fin; and the non-festooned lower lip.

Body deep and compressed, deepest at dorsal origin. Snout long, somewhat pointed in the holotype but more rounded in the paratype. Lower lip not festooned, connected with the jaw at all points, with a short fleshy barbel at each side of its midline and a long barbel at each rictus, in addition to the maxillary barbel. Coracoid processes leaving a wide area of the breast unarmed; a close-set mosaic of irregular scales covering the middle of the unarmed area. Pelvic fins originating under base of first soft dorsal ray. Anal origin directly under origin of adipose. Caudal fin deeply forked.

Dorsal I, 7½. Anal I, 6½. Caudal 4-12-4. Pectoral I, 9. Pelvic I, 6. Lateral scutes 22/21. Azygous plates 4. All these counts are identical in the paratype.

*Measurements in millimeters* (holotype first, paratype in parentheses).—Standard length 41.0 (23.0). Total length 58.0 (32.0). Head 13.5 (8.0). Snout 8.0 (4.0). Eye 4.0 (3.0). Interorbital (bony) 7.0 (3.5). Height of opercle 8.0 (5.0). Width of opercle 3.6 (2.0). Depth at origin of dorsal 17.0 (9.0). Least depth caudal peduncle 6.5 (4.). Length dorsal spine 10.5 (6.5). Length longest dorsal ray (first soft ray) 12.0 (7.0). Length longest anal ray (second branched ray) 7.5 (4.5). Length upper caudal lobe 16.5 (8.0). Length pectoral spine 11.0 (6.5). Snout tip to dorsal origin 22.5 (12.5). Greatest thickness body 10.0 (6.0). Length maxillary barbel 7.0 (2.5). All these measurements are taken from point to point, as indicated. Only the standard and total lengths are taken as to the vertical along the axis of the body.

Ground color in alcohol grayish brown. Upper two-thirds of body, the opercle, cheeks, snout, and top of head covered with a close mottling of small distinct, blackish spots. An unspotted light band as wide as the eye extends forward along the middle of the sides from the caudal base. This band is bounded above and below by a heavy aggregation of spots and along its middle runs a heavy black line covering the line of junction of the two series of lateral scutes. The effect of the whole is that of three dark lines, the middle one darkest and widest, running forward along the mid-sides

from the caudal base, as in *trilineatus*. In different individuals the three lines run further forward than in others. In the holotype they fade out under the end of the dorsal base but in the paratype they run forward nearly to the head.

A very large inky-black blotch on the first four soft dorsal rays and their membranes. The spot is separated from the fin margin by a variable clear area and in no case comes near the bases of the rays, which are clear. A few small irregular black spots on the posterior dorsal rays. Adipose with one or two small irregular black flecks. Caudal with six or seven transverse, curved black cross bars consisting of black spots on the rays only, the membranes being clear. Anal clear or with a few irregular spots on the rays which sometimes form three wavy bars; membranes clear. Pectorals and pelvics clear.

This species has been figured and the habits of a specimen I had under observation in an aquarium (the holotype) have been described in *The Aquarium*, Philadelphia, vol. 2, no. 8, Dec. 1933, pp. 188-189. The retouched photograph reproduced there is erroneous in showing the spots of the nape too vermiculated and in representing light ray lines running through the dorsal blotch. The same photograph, with a translation of part of my article, appeared also in *Aquarium*, Paris, 1934, no. 5, p. 77.

I have seen several hundred living individuals at different times in aquaria. The degree of roundness or sharpness of the snout varies considerably and small individuals are always more slender than adults. This species has lately been brought into the United States in large numbers as an aquarium fish by Mr. Karl Griem, the well-known collector and importer of Brazilian aquarium fishes. My two specimens were recently imported individuals collected by Mr. Griem and shipped to me alive by Mr. Richard Büttner of the Empire Tropical Fish Import Company of New York.

It should be noted that Mrs. M. D. Ellis (*Ann. Carnegie Mus.*, vol. 8, 1913, p. 409) has placed *Corydoras agassizi* Steindachner in the synonymy of *C. trilineatus*. *C. agassizi*, as Regan has rightly appreciated (*Ann. Mag. Nat. Hist.*, (8) vol. 10, 1912, pp. 213, 215) is certainly not the same as *trilineatus*. The living examples of *agassizi* I have seen bear little resemblance to Cope's figure of *trilineatus*.

#### **TÆNIACARA**, new genus.

Differing from *Nannacara* in the elongate form and the complete absence of a lateral line. No lobe on upper part of first gill arch. Gill rakers obsolete, reduced to tubercles which are visible only on the inner surface of the arch. Preopercle entire. Vertical fins naked. Maxillary hidden. Genotype the following species.

#### **Tæniacara candidi**, new species.

*Holotype*.—U. S. N. M. 93579, an adult male 38.5 mm. standard length, collected in the Amazon (middle), in 1934; received from Mr. Ed. Candidus of Morsemere, New Jersey, for whom the species is named.

*Paratypes*.—U. S. N. M. 93580, two half-grown specimens, 29 and 24 mm. standard length; from the same source.

Body slender, compressed, the depth 4 to 4.27 in standard length. Head 3.2 to 3.5. Eye large, 2.5 to 3.1 in head, its diameter much greater than interorbital. Caudal peduncle slightly longer than deep. Dorsal originating a little before vertical of end of opercle, its spines somewhat high, subequal in length beginning with the third. Caudal lanceolate, two or three of the median rays produced beyond the membrane (at least in the male). Anal originating under base of the twelfth dorsal spine. Tip of soft anal strongly pointed. Pelvics very long, the first soft ray greatly produced. Pectorals short and rounded, not reaching anal fin by more than half their length. Teeth conical, the outer row strong, the two or three crowded irregular inner rows of both jaws minute. Lips very thick and heavy. Maxillary concealed. Squamation of top of head stopping abruptly above middle of pupil. Opercles scaly, cheeks with a few excessively thin scales. The lateral line appears to be totally absent. Along the base of the dorsal fin membranes, there is what looks like a series of lines which at first sight would appear to be lateral line tubules, but no tubular structure can be detected under high magnification and manipulation. If this actually represents the lateral line, the structures are placed not on the scales but upon the basal membrane of the fin, thus differing from all Cichlids known to me.

Dorsal XVI, 6. Anal III, 6. Pectoral 11. Caudal 3-14-3. Pelvic I, 5. The lateral scale rows run obliquely upward to a very slight degree. The series from the mid-height of the opercle to the hypural end is 22; vertical series from anus to dorsal 7; predorsal 8. These counts are identical in the three specimens.

*Measurements in millimeters of holotype and two paratypes.*—Standard length 38.5, 29.0, 24.0. Head 11.0, 9.0, 7.5. Depth (at pelvic origin) 9.0, 7.0, 6.0. Eye 3.5, 3.0, 3.0. Snout 2.5, 2.0, 1.5. Interorbital (bony) 2.5, 2.0, 2.0. Length caudal peduncle (end anal base to vertical of hypural end) 6.5, 5.0, 4.0. Length caudal peduncle (end dorsal base to vertical of hypural end) 4.0, 4.0, 3.0. Least depth caudal peduncle 4.5, 3.5, 3.0. Greatest thickness of body (at opercular region) 5.0, 4.5, 3.7. Length third dorsal spine 10.0, 3.5, 3.0. Length caudal fin (including filaments) 16.0, injured in first paratype, 9.0 in second. Length pelvic 17.0, 10.0, 8.0. Length pectoral 6.0, 5.5, 5.0.

Ground color brownish. A broad black lateral band down the middle of the side, originating at the snout, passing through the eye, and extending out for a short distance on the caudal, where it ends abruptly although carried out to the tips of the central rays by a faint dark shade. The lateral band is one scale row in width and posteriorly it tends to spread vertically at scale junctions. It is bounded above by a light line originating in the scapular region and reaching the upper surface of the caudal peduncle. Back brownish with a tendency to be blocked off into definite darker areas. Lower parts light. An even broken dark line running back from pectoral base and fading out over anal. Dorsal plain brownish, the last few soft rays light with dark spots. Anal similar. Caudal, above the median faint longitudinal bar, light with a brownish margin along the distal terminations of the rays; below the median bar the caudal is dull

plumbeous. Pelvics with a faint dark shade. Pectorals clear. A thin, dark longitudinal bar bounding the orbit below. In the smaller paratype there is a faint dark bar extending downward from the anterior part of the eye and another downward across the preopercular angle from the lower posterior part of the eye.

In life the male holotype showed much metallic blue-green on the head and sides. Iris metallic blue-green. Upper middle part of caudal yellow, bounded terminally and superiorly with brownish. Middle caudal rays dark, lower ones purplish brown, the whole fin narrowly edged with metallic blue-green. When the fish is frightened the dark lateral band frequently entirely disappears, leaving a pattern of wide dark vertical bands or squarish blocks, an extension of the pattern seen on the back in the preserved fish.

The three type specimens were sent to me by Mr. Ed. Candidus of Morsemere, New Jersey, whose aquarium collection is famed for the ichthyological rarities it contains. The three fishes formed part of a recent importation from the Amazon, and, as has been the case with most recent shipments, they probably came from as far up the stream as the mouth of the Rio Negro, although this is not certainly known. I studied the types in an aquarium for several days before preserving them.





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THE WEST AMERICAN SPECIES OF SHRIMPS OF THE  
GENUS PENAEUS.

BY WALDO L. SCHMITT.

---

On the west coast of America we may recognize five species of shrimps of the genus *Penaeus*:

- P. brasiliensis* (Latreille) 1817
- P. occidentalis* Streets 1871
- P. stylirostris* Stimpson 1871
- P. balboae* Faxon 1893
- P. vannamei* Boone 1931

For their better understanding and ready recognition a diagnostic key is presented:

KEY TO THE SPECIES OF *PENAEUS* KNOWN FROM THE WEST COAST  
OF AMERICA.

- I. Carapace smooth and shining, may with age become coarsely punctate on the branchial regions, but never scabrous or spinulose, subhepatic crest or ridge, hepatic spine and a lateral portion of the cervical groove a prominent feature; well developed exopodites.
  - A. Lateral rostral sulci extending nearly entire length of carapace. Rostral teeth normally  $\frac{9-10}{2}$ , usually the first four dorsal teeth are on the carapace.....  
*brasiliensis* Latreille.
  - B. Lateral rostral sulci extending backward to or a little behind the first rostral gastric tooth.
    - 1. Ventral margin of rostrum normally armed with four to five teeth. Lateral rostral sulci extend behind first dorsal tooth.
      - a. Dorsal rostral teeth run to or near to the tip of the rostrum, never more than the distal third or fourth, often less, of the free portion of the rostrum unarmed above. Rostral teeth usually  $\frac{10-11}{4-5}$ ,

first three dorsal teeth on carapace, sometimes, especially in large adults, the most anterior of the ventral rostral teeth is much reduced, giving the rostrum in superficial inspection a tridentate appearance below .....*occidentalis* Streets.

- b. Approximately distal half or more of free portion unarmed above. Rostral teeth normally  $\frac{8}{4-5}$ , first three dorsal teeth on carapace.....

*stylirostris* Stimpson.

2. Ventral margin of rostrum armed with two teeth; distal half of free portion more or less unarmed above; ventral teeth in advance of last dorsal. Rostral teeth  $\frac{9-10}{2}$ , first four dorsal teeth on carapace. Lateral rostral sulci not extending behind tip or at most base of anterior margin of first dorsal tooth.....*vannamei* Boone.

- II. Carapace scabrous, rough spinulose to the touch, and "when viewed through a lens, thickly beset with minute squamiform tubercles"; sides of carapace marked with several not very strong yet noticeable longitudinal carinae; no portion of cervical groove in evidence, no subhepatic ridge or crest, hepatic spine represented by a small spine at about the anterior fifth of the second of the lateral longitudinal carinae. Rostral teeth  $\frac{16}{4-5}$ , first four dorsal teeth on carapace.....*balboae* Faxon.

*Penaeus brasiliensis* Latreille.

*Penaeus brasiliensis* Latreille, Nouv. Dict. Hist. Nat., vol. 25, p. 156, 1817.

*Penaeus brevirostris* Kingsley, Proc. Acad. Nat. Sci. Philadelphia, vol. 30, p. 98, 1878 (also issued in separate form the same year, spelled in error *Paneus*, description on p. 10 of separate).

*Penaeus californiensis* Holmes, Proc. California Acad. Sci. (2), vol. 4, p. 581, 1895; Occ. Papers California Acad. Sci., no. 7, p. 218, pl. 4, figs. 64-69, 1900.

*Penaeus braziliensis* Verrill, Trans. Conn. Acad. Art. Sci., vol. 26, p. 41, pl. 13, figs. 1-3, pl. 16, figs. 1, 2, 2a, pl. 17, fig. 10, a, d, e, f, 1922, and synonymy.

not *Penaeus brevirostris* Boone, Bull. Vanderbilt Mar. Mus., vol. 3, p. 106, text fig. 2, pl. 32, 1930; Bull. Amer. Mus. Nat. Hist., vol. 63, p. 166, fig. 13, 1931 (= *P. occidentalis* Streets).

Inasmuch as the species known as *P. brevirostris* on the west coast and *P. brasiliensis* on the east have in common a character, the lateral rostral sulci extending nearly the full length of the carapace, which serves to distinguish them from all other penaeids in their respective ranges, a comparison of the two might have been expected to show something of interest. This expectation has been realized, for the two appear to be representatives of one and the same species. There seem to be no positive characters by which they may be distinguished one from the other, despite the fact that

specimens of approximately the same size, of each sex, from both coasts have been compared. The Pacific specimens, *brevirostris*, seem as a rule to run a little heavier in body, a little longer in rostrum, with lateral rostral sulci usually narrower and with a tendency to fade out behind. But on either coast in a large series of specimens there is variation enough, if only found in occasional specimens, to blot out any differences that appeared at first to be worthy of consideration. The rostra, their toothings, spination of the legs, the subhepatic ridges, and other features of the carapace, the exopodites and mouth parts were all examined. For example, in specimens of the same size, the Atlantic specimens in general seem to have lateral rostral sulci which on the carapace proper are relatively twice the width of those of the west coast, and moreover at their hinder ends sharply marked off from the general surface of the carapace; the west American specimens have narrow sulci which at their posterior ends pass over more or less gradually into the surface of the carapace, yet from several of the West Indies and from off the coast of Brazil we have good series of *P. brasiliensis* with the narrow Pacific type of rostral sulci.

There seems likewise to be no tangible difference in the relative stoutness of the legs, a character referred to by Holmes in describing his *P. californiensis* and contrasting it with *P. brasiliensis*. The petasmae and thelyca, allowing for expected variation and growth stages, may well be considered identical. I am not unmindful of the fact that the thelycum of either of the species here united in general character is like that of certain Indo-Pacific and Australian species, *P. latisulcatus*, *esculentus*, and *plebejus*, but no such differences as distinguish those three are to be found in the Atlantic and Pacific material at hand.

It was not until this study had been about completed that I became aware of the fact that Verrill had already (1922) placed Kingsley's *brevirostris* in synonymy with *P. brasiliensis*. He does not otherwise comment upon his action, nor does he include the Pacific distribution in his résumé of the range of *brasiliensis*.

A somewhat parallel distribution of another common West Indian form is that of the stomatopod, *Gonodactylus oerstedii* Hansen, which has been found to be not uncommon on the West Coast, particularly in the Gulf of California, where *P. brasiliensis* (= *P. brevirostris*) also abounds.

In the Pacific *P. brasiliensis* ranges from San Francisco, California (Holmes), Santa Monica and San Diego, to the Bay of Sechura, west of Mataballa, Peru, including the Gulf of California, Bay of Panama, and the Galapagos Islands. The largest Atlantic representative I have personally examined is about  $5\frac{3}{4}$  inches (145 mm.) long, however Mr. Milton B. Lindner, in charge of the Louisiana shrimp investigations of the U. S. Bureau of Fisheries, tells me that *P. brasiliensis* attains a maximum size of about 200 mm.; the largest Pacific about 7 inches (177 mm.), Miss Rathbun (1910) cites one of 190 mm. in length. The rostral armature is usually or normally  $\frac{9-10}{2}$ ; occasionally, or even rarely, specimens may be found with 8 or 11 teeth above, and 1 or 3 below, these ventral variations are perhaps abnormal; usually there are four teeth on the carapace behind the orbital margin. The post rostral carina is more or less sulcate; in

specimens where this groove is pronounced the carapace may appear plainly trisulcate.

*Penaeus occidentalis* Streets.

*Penaeus occidentalis* Streets, Proc. Acad. Nat. Sci. Philadelphia, vol. 30, p. 343, 1871.

*Peneus brevirostris* Boone, Bull. Vanderbilt Mar. Mus., vol. 3, p. 106, text fig. 2, pl. 32, 1930; Bull. Amer. Mus. Nat. Hist., vol. 63, p. 166, figs. 13, 14, 1931.

Through the kindness of Dr. H. A. Pilsbry I was enabled to examine the type lot of specimens upon which Streets based his original description, and so here to identify with them a considerable series of specimens purchased in the public market at Panama while a member of the Hancock Galapagos Expeditions of 1933 and 1934.

The types are somewhat broken and in rather soft condition; the largest is no more than 124 mm. in length. The specimens purchased in Panama, besides forty which in size are comparable to the types, include four of much larger stature, a male and three females ranging in length from  $7\frac{3}{4}$  inches, the male to  $8\text{--}7\frac{7}{8}$  inches (171–225 mm.).

Like certain Indo-Pacific penaeids, *P. indicus* young and old as figured by Alcock (Cat. Indian Dec. Crust., pt. 3, fasc. 1, pl. 1, figs. 3, 3a, 1906) and *P. merquiensis* de Man (Siboga Exped., monog. 39a, p. 104, 1911), the younger, less mature specimens of *P. occidentalis* have a rostrum relatively much longer than the more developed fully grown individuals.

In smaller, younger *P. occidentalis* the great part of the free portion of the rostrum is before the cornea, while in the larger, fully matured specimens the reverse is true, and the rostra which in youth markedly exceeded the antennular peduncle scarcely exceed it if they do not indeed fall short of the distal margin of its terminal segment.

The four large specimens from Panama have from ten to twelve rostral teeth above, two had eleven, while below there are three well marked ones with the suggestion of a fourth near the tip. Though not readily perceptible to the eye, except on close inspection, the latter can be readily felt in passing the edge of one's finger nail along the lower margin of the rostrum. In one of the four specimens this fourth ventral tooth was evidenced by a little notch in the lower margin, no more. The lateral rostral sulci run backward to a point behind the first dorsal rostral tooth, the outer ridge either side forming them is very strong, especially in small specimens, far more so than in the related west coast species. The thinner and longer of the antennular flagella are no longer than the antennular peduncles.

The petasma has been quite well figured by Miss Boone for specimens of this species which she mistakenly assigned to *P. brevirostris*, but her figure of the thelycum in no way gives the semblance of the one characteristic of the species. In immature individuals it is a convex, gently bowed up, shield-shaped plate with a slightly raised posterior margin and a medially raised longitudinal ridge which fades out before the middle of the shield (pl. I, figs. 1, 2). The sternal plate of the young not fully developed

males is quite similar in appearance. In mature females this shield becomes an irregularly radially ridged, or plicate, somewhat soft, more or less hairy plate which to first appearances might be taken to be an attached spermatophore, but it is the thelycal plate itself (pl. I, fig. 5). The bases of the last two pairs of legs have small knob-like projections; those of the last pair are tipped each with a conspicuous hair tuft.

Of this species I have further examined a fairly large male from Punta Arenas, Costa Rica, originally determined as *P. stylirostris* for Dr. Manuel Valerio, the collector, at a time when the correct status of these several Pacific peneids had not yet been satisfactorily cleared up, and a large, but much broken, female from Panama caught Oct. 27, 1933, in about 15 feet of water, near rocks, by Constant Greco, Sr., of New Orleans, and received through the kindness of Mr. Milton J. Lindner of the U. S. Bureau of Fisheries. This last mentioned specimen, despite the impossibility of accurately measuring it in its much broken condition, appears to have been something in excess of 9 inches in length.

*Penaeus stylirostris* Stimpson.

*Penaeus stylirostris* Stimpson, Ann. Lyc. Nat. Hist., New York, vol. 10, p. 134, 1871.

not *Peneus stylirostris* Boone, Bull. Amer. Mus. Nat. Hist., vol. 63, p. 169, fig. 15, 1931 (= *Xiphopenaeus riveti* Bouvier).

There is but little to add to the author's original account. His description of the thelycum unmistakably fixes the species. "In the female the feet of the last three pairs bear lamelliform processes on the inner sides of the coxae, and the sternum between the bases of the posterior feet bears a short but much projecting dentiform median carina."

The rostrum reaches forward in young specimens of about 70 to 80 mm. to a third of the length of the free portion beyond the antennal scales, growing shorter with size and development, so that in specimens of  $7\frac{1}{2}$  inches (190 mm.), falling short of the scale, it will be no longer than the antennular peduncle. The rostral teeth with rare exceptions, two out of thirteen specimens, will number eight above, two specimens had nine, while a fourteenth one with an abnormal rostrum had 4 above and 3 below. Usually there are 4 teeth on the ventral margin. Two out of five specimens had 5, but these had only 8 teeth above; the fifth ventral tooth in both these cases is a tiny one quite close under the extreme tip. The distal half of the rostrum, more or less, is unarmed. The lateral rostral sulci, as in *P. occidentalis*, run back behind the first dorsal tooth; the first three dorsal teeth are on the carapace. The thinner, longer antennular flagellum is about as long as the carapace. The petasma is simple. Two males, which had the two leaves or lobes forming the adult petasma united, had a petasma greatly resembling that of the Indo-Pacific *P. semisulcatus*.

The largest specimen I have seen is a female full seven and a half inches (190 mm.) long, from Mazatlan, Sinaloa, Mexico, Carlos Stansch, Sr. collector. The farthest north specimens to my knowledge are five that were obtained for the National Museum by the former U. S. Consul Bartley



F. Yost, at Guaymas, Sonora, Mexico. The species is apparently not uncommon along the coasts of Mexico and Panama; aside from various other places along the coast, there are at hand about half a dozen specimens from Mazatlan other than the one mentioned above, received through the kindness of Mr. W. E. Chapman, former U. S. Consul, and Señor Jesus G. Ortega of that place, and as many more from the Canal Zone collected by Drs. Meek and Hildebrand in the course of the Smithsonian Biological Survey. Specimens which have been assigned to this species from off Costa Rica and Peru are quite young, small and immature, so that they can not with absolute certainty be excluded from *P. occidentalis*. I believe them to be correctly determined as *P. stylirostris*. The salt creeks at La Palisada, near Tumbes, are the known southern limit of the range of the species.

*Penaeus balboae* Faxon.

*Penaeus balboae* Faxon, Bull. Mus. Comp. Zoöl., vol. 24, p. 211, 1893; Mem. Mus. Comp. Zoöl., vol. 18, p. 181, pl. 47, fig. 1-1c, 1895.

For the present this species seems best accommodated as Faxon has it in *Penaeus*, though in external appearance at least, it does differ in several particulars from what has been recognized as the general or normal facies of the genus.

Faxon has fully described and figured the species with the exception of the rostrum which in his unique holotype lacked the distal extremity.

There are seven specimens, three males and four females, of *P. balboae* in the collections of the National Museum determined by Dr. Mary J. Rathbun which were also taken by the *Albatross* off the Gulf of Panama, but on an earlier cruise and at the surface, April 1, 1888, Surf. sta. 25, Lat. 4° 18' N., Long. 85° 14' W. Faxon's specimen came up in a dredge haul made at 770 fathoms, March 1, 1891, Sta. 3371, Lat. 5° 26' 20" N., Long. 86° 55' W.

The tip of the rostrum extends nearly to the end of the second joint of the antennular peduncle or falls a bit short of it. Above the rostrum is armed with 16 and below with 4 to 5 teeth. Thus it would appear that Faxon's type lacked but the distal half of the free portion of the rostrum; the ventral teeth are all before the distal margin of the cornea.

*Penaeus vannamei* Boone.

*Penaeus vannamei* Boone, Bull. Amer. Mus. Nat. Hist., vol. 63, p. 173, fig. 16, 1931.

Miss Boone's species is based in part on specimens in the collections of the American Museum which I had labelled as representing a new species some years before and of which the National Museum was permitted to retain one of the four immature males collected by Señor M. Gallegos, Mar. 23, 1920, in the Estero de Caliquey, Escuinapa, Sinaloa, Mexico, and presented by him to that institution.

The figure accompanying the original description of the species is in-

correct in showing the lateral rostral sulci extending backward behind the first rostral tooth. Usually they terminate about on a level with the tip of the first rostral tooth, and at most do not extend behind the base of the anterior margin of that tooth. The given magnification of the figure is also in error. The type is stated to be about four inches long (101 mm.  $\pm$ ). The figure measures easily double that. The rostrum of the figured specimen is exceptionally short. Often, especially in larger specimens, it exceeds slightly the antennular peduncle; in none of the specimens I have examined does the rostrum fall short of the terminal joint of the peduncle. Young specimens do not seem to have the relatively longer rostra found in the young of *P. occidentalis* and *stylirostris*.

As has been stated, *P. vannamei* is the Pacific analog of *P. setiferus*. The combination of rostral teeth most frequently met with in both species is  $\frac{9}{2}$ . Although some authors grant *P. setiferus* a range in number of dorsal teeth up to 10, there are usually 8 or 9. In *P. vannamei*, on the other hand, the total count is either 9 or 10. In the latter, furthermore, with but one doubtful case in more than a dozen specimens, the first four rostral teeth are situated on the carapace proper, behind the orbital margin. *P. setiferus* seems less particular in this regard, 3 or 4 lying posterior to the orbital margin. I have personally seen no exception to the rule of two ventral rostral teeth in either species. However, those of *P. vannamei* are closer together than in its analog. In the former they are about as close together as the second and third dorsals, while in the latter they are farther apart, approaching more in separation the distance between the first and second dorsals.

A mature male is yet to be described. Though a considerable series of specimens have passed through my hands and I have seen not less than eight males of fair size, up to 128 mm. in length, in none have the right and left lobes of the petasma yet become united with each other. Thus it is left for the female to furnish in the structure of its thelycum the means of best distinguishing this species.

In *P. vannamei* the plate between the fifth pair of legs has an anterior median horse-shoe, or U-shaped depression, open end forward, which medially may show a very faint ridge anteriorly raised to form a low obscure tubercle; the anterior margins or ends of the raised portion of the plate encircling the depressed area form each a somewhat semicircular, more or less perpendicularly upturned lobe. The coxae of the fourth legs are produced to form two somewhat disciform, though not large, projections which tend to overhang and in part hide from view the base of the obliquely anteriorly directed, distally rounded, trough-shaped plate arising from the thoracic sternum between that pair of legs. I am tempted to liken it to the back of a Spanish comb. It is quite the chief character of this species as compared with other American penaeids.

Beyond the four specimens belonging to the American Museum, some forty odd, all told, have been examined, nearly all from the coast of Sinaloa, Mexico, whence they were secured through the kindness of two residents of Mazatlan, Señor Jesus G. Ortega and Mr. W. E. Chapman, former U. S.

Consul, and Señor Carlos Stansch, Sr., of the Dept. Forestal y de Caza y Pesca, Mexico, D. F., at the time located at Teacapan.

Mazatlan seems to be about or near the northern limit for this species, for it is not represented among the penaeids secured by the former American Consul at Guaymas, Sonora, Mr. Bartley F. Yost, from the shrimp fisheries in that vicinity. There *P. stylirostris* is the commercially utilized species. To the south *P. vannamei* ranges at least to the Bay of Panama, for the specimen that Miss Boone took for the type of the species was purchased in the market at Panama City. The National Museum has also a young female from Corozal, Canal Zone, April 18, 1911, Meek and Hildebrand, Smithsonian Biological Survey, collectors.

Señor Stansch also kindly furnished us with a color sketch of this species, showing the normal whitish-greenish bronze-flecked, translucent coloration, and another of a color phase of this same species, a beautiful light cerulean blue, becoming lighter toward the underparts, stippled with a darker blue of the same sort; as in the normally colored individuals, the antennal flagella are a reddish brown, and the distal margins of the uropods are tinged with red.

This species first came to my attention back in 1919 when Mr. R. A. Coleman, then the U. S. Bureau of Fisheries agent at San Francisco, California, submitted several samples of commercial dried shrimp in the shell for identification. The demonstrable characters precluded their identification with any of the then known species of *Penaeus*. Pains were taken to secure fresh material through the intermediation of the State Department, which led to the contacts established with the several gentlemen here referred to.

In a report on "The Shrimp Industry at Mazatlan," Daily Consular and Trade Reports, Dept. of Commerce, No. 198, Aug. 24, 1917, U. S. Consul W. E. Chapman gives some information regarding the commercial utilization of this shrimp:

"There are some 40 or 50 shrimp fisheries along the Pacific shore line within this consular district, with the trading center of the industry at Mazatlan. Most of the shrimp are collected during the rainy season—from July to November—in numerous shallow lagoons along the seashore. They are brought in from the adjacent waters of the Pacific Ocean by the currents. It often happens that there are large areas of the sea literally filled with them.

"All lagoons utilized in catching the shrimp are traversed at the inlet by a dam with two rows of light piling about 4 feet apart filled in with enough fine brush to prevent the shrimp passing through. Depending upon the length of the dam, one or more traps of the ordinary style of lobster trap are located at convenient intervals for allowing the shrimp to enter the lagoon and at the same time for catching them when the fishermen are ready to take them from the water. When they first enter the lagoons from the sea they are usually small, although in some seasons they are large enough for immediate use.

"The lagoons produce a weed or grass that grows from the bottom and is known locally as paiste. Immediately upon entering the lagoons the shrimp begin feeding upon this weed so that in seasonable years the average length of the shrimp increases to about  $4\frac{1}{2}$  inches.

"Unlike the ordinary species of fish, shrimp move with the currents of water in which they are found. Therefore the fishermen watch for the rising of the tide to open the entrances through the dams and the falling of the same to close them.

"When the shrimp have reached full growth in the lagoons the fishermen set their traps and again utilize the force of the tide, this time the outgoing one, in making the catch. At each trap, if there are men enough, one man uses a sort of basket fastened to the end of a pole with which to dip the shrimp from the trap and deposit them in a canoe. Generally several canoe loads are taken to camp by each man at each tide, making it possible for a few men to gather several tons in a day.

"Many of the smaller operators in the shrimp industry catch with nets ranging from 100 to 400 feet in length, either in the lagoons or in shallow water along the open seashore.

"When the shrimp season is good, as is usually the case, it is not uncommon for 10 men to catch 20 tons of shrimp in a period of eight hours, using the hand nets. Of course this success can be attained only on such occasional days as the shrimp happen to drift within the scope of operations.

"The shrimp industry in this district provides three forms of the preserved product for the trade, namely (a) Mexican shrimp which is salt-dried and so called because it is produced principally by Mexican fishermen and used almost exclusively in the Mexican trade. It is packed in mat bags with the head and shell on and is first in importance among the three products. (b) China shrimp, which is cooked with a little salt and then dried with the head and shell removed. It was so named because it is produced by the Chinese to some extent and is prepared for the use of the Chinese in Mexico, the United States, and even in China. China shrimp is second in importance. (c) Canned shrimp, which is prepared for the market in the United States at a few small canneries located at points adjacent to the fisheries. All of the canning factories are operated by Americans.

"One American concern that has been in the shrimp-canning business during the past three or four years, having a plant with a daily capacity of 5,000 cans, is taking steps to reorganize for the purpose of increasing its output to about 20,000 cans daily. It will install can-closing machinery. The closing of shrimp cans in the past has been done by hand.

"The shrimp industry in this district, however, is not carried on without some difficulties. The foreigner can not succeed unless he has a good command of the Spanish language, a good knowledge of local conditions affecting the business, and plenty of capital with which to work. Catches will be lost if exposed to heavy rains during the process of drying in the case of Mexican or China shrimp, or before the canned shrimp are put up unless some method of covering is employed at a heavy cost. Another difficulty is the matter of gauging the number of laborers necessary to the success of the season or of the particular catch, as several thousand dollars may be lost in shrimp over night due to insufficient help.

"The shrimp industry appears to be in its infancy, and is conducted on a small scale in this section of Mexico, handling only about 10 per cent of the available supply."

Among the Sinaloa peneids, *P. vannamei* predominates, with *P. brevirostris*, now *braziliensis*, a fairly close second. That the former is apparently the mainstay of the fishery is borne out by the fact that several samples of the dried shrimp from Mazatlan proved to be that species, and that the commercial shrimp exhibited in the Mexican Exhibit at the World's



Columbian Exposition in Chicago in 1894 were likewise this species. There were three males and a female in this particular lot, of which one of the males, noted above, was the largest of the species and of its sex that I have seen, 128 mm. in length—Señor Stansch, quoted below, gives the maximum length of the species as 25 cm. (nearly 10 inches!). These specimens were only recently located among some of the unidentified materials in this Museum, but had been labelled at the time of their receipt by Dr. Mary J. Rathbun as *Penaeus* near *setiferus*.

One of the specimens of *P. vannamei* received from Señor Stansch was accompanied by the following note in Spanish: "From the end of March onward this species of shrimp enters the mouths of the rivers and streams. It is then 1 cm. in length, more or less, and very transparent. It goes as far as the mouths of the most distant estuaries, as much as 50 km. from their mouths. During the months from May to September it lives in the estuaries and lagoons, growing to its normal size, which is from 12 to 25 cm. long. Its food consists of vegetable elements (algae), animals (entomostraca, hydrozoa), and [detritus]. Toward the end of August they start on their way back to sea."

Notes on the shrimp fishery at Guaymas, Sonora, Mexico, where *P. stylirostris* would seem to be the important species, and Topolobampo, Sinaloa, from which place I have no specimens, by Bartley F. Yost, U. S. Consul at Guaymas, as of August 15, 1922, are issued in the form of a mimeographed circular (Mem. S-226) by the U. S. Bureau of Fisheries.

#### EXPLANATION OF PLATES.

##### Plate 1.

- Fig. 1, 2. *Penaeus occidentalis*, young females, 4/5ths natural size, two of Streets' types from Panama (McNeill Exped., No. 73, Acad. Nat. Sci. Philadelphia).
- Fig. 3, 4. Same, thelyca, respectively of preceding, x 2.4.
- Fig. 5. *Penaeus occidentalis*, fully developed, mature female, x 2.4, purchased in Panama.
- Fig. 6. *Penaeus vannamei*, thelycum of female, nearly x 4, Mazatlan, Mexico, Aug. 1923, Jesus G. Ortega, coll., W. E. Chapman, donor.
- Fig. 7. Same, thelycum of another female, nearly x 4, Mazatlan, Mexico, Carlos Stansch, Sr., Sec. Agr. Fom. Sec. Estud. Biol., Mexico, D. F. coll. & don.
- Fig. 8. *Penaeus stylirostris*, thelycum of mature female, about x 2.4, Mazatlan, Mexico, Carlos Stansch, Sr., Sec. Agr. Fom. Sec. Estud. Biol., Mexico, D. F., coll. & don.

##### Plate 2.

- Penaeus occidentalis*, fully developed mature female, 4/5ths natural size, purchased, Panama. (Thelycum of this specimen is figured pl. 1, fig. 5.)

















PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW ANABANTID FISH OF THE GENUS *BETTA*  
FROM JOHORE.

BY GEORGE S. MYERS.

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Mr. C. M. Breder, Jr., Assistant Director of the New York Aquarium, has recently been investigating the breeding behavior of two species of *Betta* which practice oral brooding instead of building a floating nest of foam, as is the practice of *B. splendens* and *B. bellica*. Mr. Breder has sent me specimens of his two species for determination. The smaller one agrees with *B. picta* (Cuvier and Valenciennes) but the larger seems to be an unknown form, not only one of the largest but also one of the most well-marked species of *Betta* yet discovered.

***Betta brederi*, new species.**

*Betta pugnax* (nec Cantor) Brind, 1934, p. 95 (stream in Johore to the westward of the Johore River).

*Betta* sp. Breder, 1934, p. 126, fig. (Johore; breeding habits in aquaria).

*Holotype*.—U. S. N. M. 94400, an adult female 66 mm. standard length (91 mm. total), from swift-flowing water in a small stream in Johore which empties into Johore Strait near the middle of the latter and west of the Johore River (probably the Sungai Tebrau), taken together with a species of *Channa* (*Ophicephalus*) and *Rashora heteromorpha* in the spring of 1933 by Arnold Ramsperger, and brought alive to New York; received from C. M. Breder, Jr.

*Paratype*.—U. S. N. M. 94442, an adult male 69 mm. standard length 98 mm. total, same data as holotype.

A large, very robust species, differing from all described forms in the presence of two short, stout, sharp spines in the dorsal fin.

Dorsal II, 8-9. Anal II, 23-24. Caudal 13. Pectoral 12. Pelvic I, 5. Scales lateral 29 (plus 3 on base of caudal); predorsal (to snout-tip) 23-25; transverse (between mid-dorsal scale series and anal fin origin) 11. Dorsal originating slightly nearer vertical of end of opercle than vertical of end of hypural fan, over sixth soft ray of anal and opposite fourteenth scale of mid-side series; fifth soft dorsal ray longest, attenuate. First soft pelvic

ray filamentous. Caudal strongly acuminate. Head approximately equal to depth, about 3.1 times in standard length. Eye 3.9 in head; 1.5 in interorbital; shorter than snout. Maxillary reaching vertical of posterior nostril, not quite to front border of eye. Depth of caudal peduncle equal to head behind anterior border of pupil.

*Measurements of holotype in millimeters* (figures for paratype in parentheses).—Standard length 66.0 (69.0). Total length 91.0 (98.0). Head 21.0 (22.0). Eye 5.3 (5.7). Interorbital (bony) 8.0 (9.6). Snout 6.0 (7.6). Depth 21.2 (22.0). Depth caudal peduncle 14.0 (15.5). Predorsal length 42.0 (45.0). Base anal fin 34.0 (35.0). Base dorsal fin 10.3 (10.0). Greatest thickness of body 14.0 (17.0). Length pectoral 13.0 (15.0). Length longest dorsal ray (fifth) 15.0 (21.0). Length longest anal ray (twenty-first) 21.0 (24.0). These measurements are made in the usual way, with calipers, from point to point as indicated, not as to the vertical of the points along the axis of the fish.

Color in spirits dark, dull brownish, with three faintly darker longitudinal lines along the sides on the fourth, sixth and eighth scale rows below the dorsal. Unpaired fins blackish. Pelvics dark, the filament tipped with white. Pectorals hyaline.

For comparison with the new fish the National Museum has material only of *Betta splendens* Regan, *B. anabatooides* Bleeker, *B. patoti* Weber and de Beaufort, *B. picta* (Cuvier and Valenciennes), *B. taeniata* Regan, and *B. bellica* Savage. None of these approach *B. brederi* closely.

The locality data for the new fish has been derived from Brind's paper. Brind obtained his information directly from the collector. The two type specimens were among those mentioned by Brind as having been purchased for the New York Aquarium by Mr. C. W. Coates of that institution at the time the fish arrived in New York.

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PROCEEDINGS  
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DESCRIPTIONS OF THREE NEW RACES OF BRUSH  
RABBIT FROM CALIFORNIA.

BY ROBERT T. ORR,

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During the course of a systematic study of the Leporidae of California, three heretofore unnamed geographic races of *Sylvilagus bachmani* have been recognized. These may now be named and described as follows:

***Sylvilagus bachmani tehamae*, new subspecies.**

*Type*.—Adult male, skin and skull; no 34971, Mus. Vert. Zool.; from Dale's, on Paine's Creek, 600 feet altitude, Tehama County, California; collected December 26, 1924, by J. Grinnell; orig. no. 6183.

*Geographic range*.—From the Rogue River Valley, Jackson County, Oregon, south through northern California, along the inner coast ranges, to southern Lake County, and along the western slope of the Sierra Nevada to Placer County; found in suitable territory on the floor of the Sacramento Valley at least as far south as Butte County.

*Diagnosis*.—Size: medium, with ears slightly larger and hind feet somewhat shorter than in *Sylvilagus b. ubericolor*. Color: slightly paler dorsally, and noticeably paler on sides, than in *ubericolor*; tips of ventral hairs white. Skull: rostrum very broad at base, tapering rather abruptly; postorbital notches well rounded; palatal bridge relatively long; auditory bullae small, although definitely larger than in *ubericolor*.

*Measurements*.—The average and extreme measurements in millimeters of six adults from Tehama and Shasta counties are as follows: Total length, 322.5 (305-340); tail vertebrae, 28.3 (22-33); hind foot, 73.2 (70-78); basilar length, 49.0 (48.3-50.0); zygomatic breadth, 31.9 (31.2-32.7); postorbital constriction, 10.8 (9.8-11.8); greatest length of nasals, 26.9 (26.3-27.8); greatest combined width of nasals, 13.3 (12.7-14.0); alveolar length of upper molar series, 11.9 (11.7-12.0); diameter of external auditory meatus, 4.0 (3.8-4.3); breadth of brain case measured from inner side of one external auditory meatus to that of its opposite, 22.0 (21.2-22.5); least length of palatal bridge, 5.9 (5.3-6.5).

*Remarks*.—The range of this race is tentatively extended north to the

Rogue River Valley on the basis of one adult specimen examined from Prospect, Jackson County, Oregon. The skin of this individual is in extremely worn pelage, but the skull is in perfect condition, showing the short, basally broad rostrum characteristic of *tehamae*.

*Specimens examined*.—A total of 58, from the following localities: Oregon: Jackson County: Prospect, 1. California: Shasta County: three miles west of Knob, 4400 feet altitude, 3 (coll. Calif. Acad. Sci.); McCloud River near Baird Station, 1; Stillwater, 4 (coll. U. S. Biol. Survey). Trinity County: Hayfork, 1; South Fork Mountain, 8; divide twelve miles north of North Yolla Bolly Mt., 4400 feet altitude, 1. Tehama County: 600 feet altitude, on Paine's Creek, 4; Lyman's, 3300 feet altitude, four miles northwest of Lyonsville, 3; Manton, 2300 feet altitude, 9; Mill Creek, two miles northeast of Tehama, 2; Tehama, 1 (coll. U. S. Biol. Survey). Butte County: fourteen miles south of seven miles west of Chico, 7. Yuba County: Rackerby, 2 (coll. Calif. Acad. Sci.). Placer County: Auburn, 3 (coll. U. S. Biol. Survey). Mendocino County: Lierly's Ranch, four miles south of Mt. Sanhedrin, 2; three miles south of Covelo, 2. Lake County: Castle Springs, 2700 feet altitude, 1 (coll. Calif. Acad. Sci.); Glenbrook, 1 (coll. Calif. Acad. Sci.). Colusa County: three miles west of Stonyford, 1. Yolo County: Rumsey, 1.

***Sylvilagus bachmani macrorhinus*, new subspecies.**

*Type*.—Adult female, skin and skull; no. 51679, Mus. Vert. Zool.; from Alpine Creek Ranch, three and one-half miles south of two and one-third miles east of Portola, 1700 feet altitude, San Mateo County, California; collected April 18, 1932, by E. Lowell Summer, Jr.; orig. no. 138.

*Geographic range*.—West-central California, from San Francisco south along the coast to north end of Monterey Bay and inland from southwestern Solano County south to Santa Clara County.

*Diagnosis*.—Size: slightly smaller than *Sylvilagus b. ubericolor*, but ears longer. Color: intermediate between *ubericolor* and *bachmani*. Skull: large, rostrum long and narrow in comparison with *bachmani* from coastal San Luis Obispo County; postorbital notches slit-like instead of oval-shaped as in *ubericolor*; anterior palatine foramina moderately constricted posteriorly; auditory bullae of medium size.

*Measurements*.—The average and extreme measurements of nine adult topotypes are as follows: total length, 346.1 (319–372); tail vertebrae, 40.8 (36–45) (average of eight); hind foot, 72.9 (70.8–77.2); ear from crown, 74.8 (70–78); ear from notch, 64.1 (61–66); basilar length, 50.9 (49.5–52.4); zygomatic breadth, 31.9 (31.0–33.3); postorbital constriction, 10.4 (9.0–11.7); greatest length of nasals, 27.9 (26.2–29.6); greatest combined width of nasals, 12.4 (11.7–13.1); alveolar length of upper molar series, 12.9 (12.4–13.4); diameter of external auditory meatus, 5.0 (4.7–5.4); breadth of brain case measured from inner side of one external auditory meatus to that of its opposite, 22.2 (21.2–23.5); least length of palatal bridge, 5.3 (5.0–6.2).

*Remarks*.—Material at hand from the north and south sides of San Francisco Bay, representing the races *ubericolor* and *macrorhinus*, indicates



that in respect to at least two of the cranial characters studied, namely, the shape of the postorbital notch and the size of the auditory bullae, these two subspecies do not overlap.

Two specimens examined from southwestern Solano County, while from north of the bay, come from near the delta region and show no close relationship to *ubericolor*. These individuals are as gray as *riparius*, but in cranial characters they more nearly agree with *macrorhinus*.

*Specimens examined*.—A total of 105 from the following localities in California: Solano County: ten miles southwest of Suisun, 2 (coll. Ralph Ellis, Jr.). Contra Costa County: near Walnut Creek, 2; west side of Mt. Diablo, 5; Pacheco, 1; near Moraga, 1. Alameda County: near Berkeley, 23; Oakland, 1. San Francisco County: San Francisco, 3 (coll. Calif. Acad. Sci.). San Mateo County: Menlo Park, 7; Alpine Creek Ranch, 1700 feet, 48. Santa Clara County: Stevens Creek, 3; San Jose, 1; Black Mountain, 4. Santa Cruz County: near Santa Cruz, 4.

#### ***Sylvilagus bachmani riparius*, new subspecies.**

*Type*.—Adult female, skin and skull; no. 57348, Mus. Vert. Zool.; from west side of the San Joaquin River, 2 miles northeast of Vernalis, in Stanislaus County, California; collected November 11, 1931, by Robert T. Orr; orig. no. 448.

*Geographic range*.—Known only from the vicinity of the type locality, on the west side of the San Joaquin River in northern Stanislaus and southern San Joaquin counties.

*Diagnosis*.—A moderately pale, gray-sided brush rabbit, resembling *Sylvilagus b. virgulti* of the Salinas Valley externally, but with slightly darker color dorsally. Skull: similar to that of *virgulti* in size but with zygomatics more broadly expanded; rostrum of medium size but differing from all other forms of *bachmani* in that it bulges laterally; nasals lacking much of the anterior constriction seen in *macrorhinus* and *virgulti*; anterior palatine foramina almost entirely lacking posterior constriction; postorbital notches slit-like; auditory bullae of medium size, larger than in *macrorhinus*.

*Measurements*.—The average and extreme measurements of four adult topotypes are as follows: Total length, 328.0 (307–347); tail vertebrae, 38.8 (36–41); hind foot, 76.5 (75–78); ear from notch, 69.5 (68–73); basilar length (3 averaged), 48.8 (47.9–50.0); zygomatic breadth (3 averaged), 31.4 (31.3–31.5); postorbital constriction, 9.9 (9.1–10.5); greatest length of nasals, 27.9 (27.0–29.3); greatest combined width of nasals, 12.2 (12.0–12.6); alveolar length of upper molar series, 12.4 (12.2–12.5); diameter of external auditory meatus (3 averaged), 5.0 (4.8–5.2); breadth of brain case measured from inner side of one external auditory meatus to that of its opposite (3 averaged), 21.7 (21.1–22.3); least length of palatal bridge, 4.9 (4.6–5.1).

*Remarks*.—The presence of *Sylvilagus bachmani* on the floor of the San Joaquin Valley has not, as far as known, previously been recorded. In the spring of 1931 the writer obtained his first individual of this species in

northern Stanislaus County. On subsequent visits to the same locality four additional specimens were obtained.

*Specimens examined.*—A total of five, from the west side of the San Joaquin River near Vernalis, in Stanislaus County, California.

It is appropriate here to express appreciation to officials of the United States Bureau of Biological Survey and of the California Academy of Sciences, and to Mr. Ralph Ellis, Jr., for the use of material having an important bearing upon this work, and, likewise, to Mr. E. Lowell Summer, Jr., of the California Fish and Game Commission, who contributed a large series of brush rabbits from San Mateo County, California.

*December 20, 1934.*

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW PLANT OF THE GENUS *POLYGALA* FROM  
MEXICO.

BY S. F. BLAKE.

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The new *Polygala* here described is contained in a series of about 24 collections of the genus made in the State of Mexico by Mr. G. B. Hinton in 1932-33 and submitted for identification by Sir Arthur W. Hill of the Royal Botanic Gardens at Kew. This collection also includes excellent specimens (no. 1810) of the rare *Polygala crinita* Chod. from a dry hill at Vigas, District of Temascaltepec, State of Mexico. This species was based on two collections (nos. 404, 403) in the herbarium at Monaco obtained by Karwinski "in Mexico prope Crista," a locality of uncertain position. The plant was long afterward collected by T. S. Brandege in 1904 in the Cerro Colorado, Sinaloa, and redescribed as *P. setifera* Brandeg. It has apparently not been obtained by any other botanists. Mr. Hinton's collection of this unique species considerably extends its definitely known range.

***Polygala hintonii* Blake, sp. nov.**

*Annua tenuis glaberrima; folia alterna linearia; racemi cylindrici v. conico-cylindrici acuminati densiflori 4-6 mm. diam.; bractae lanceolato-subulatae persistentes; flores parvi rosei v. albi brevissime pedicellati; alae ovoides v. ovali-ovatae; crista paucifida; capsula stipitata alis multo brevior; semen glabrum 0.7 mm. longum; arillus obsolescens.*

Very slender erect annual, 2-4 dm. high, glabrous throughout, erectish-branched toward apex, the stem solitary, surpassed by the branches, all terminated by racemes; lowest leaves (cotyledons?) one pair, oval or obovate, short-petioled, 3-5 mm. long, 2-3 mm. wide, obtuse, the others all scattered, linear, 5-15 mm. long, 0.2-0.7 mm. wide, acute, usually erectish, short-petioled, bearing several immersed glands, the uppermost reduced, bracteiform; peduncles 1.5-4 cm. long; racemes cylindric or conic-cylindric, acuminate or in age only apiculate, 7-22 mm. long, 4-6 mm.

thick, the axis becoming 3.5 cm. long; pedicels ca. 0.3 mm. long; bracts lanceolate-subulate to lance-ovate, acuminate, 1-1.2 mm. long, spreading or curved-ascending, with 2 yellow glands at base; upper sepal ovate, acutish, slightly toothed or erose, pink or white, 1-1.2 mm. long; lower sepals similar, 0.8-1 mm. long; wings rosy or white, oval or oval-ovate, 2- (fruit) 3 mm. long, 1- (fruit) 1.4 mm. wide, rounded or obtuse, often minutely erose at apex, short-clawed, 3-nerved; upper petals obliquely ovate, subtruncate and obscurely erose at apex, 1.4-1.8 mm. long; keel 1.2-2.1 mm. long, bearing 2 large yellow glands, the crest on each side of 2 linear lobes and a subquadrate lamella; stamens 8, the anthers somewhat longer than the glabrous free part of the filaments; capsule (including stipe) 1.3-1.6 mm. long, 0.8 mm. wide, the body about 1 mm. long, obliquely suborbicular, with 2 pairs of roundish glands along septum, borne on an obliquely curved compressed stipe about half as long; seeds ellipsoid-cylindric, 0.7 mm. long, 0.3 mm. thick, black, glabrous, shining, minutely striate, minutely apiculate at base; aril obsolescent.

MEXICO: Rincón, Dist. Temascaltepec, State of Mexico, 15 Feb. 1932, *G. B. Hinton* 256 (type no. 1,589,185, U. S. Nat. Herb.); in oak woods, Mina de Agua, same District, alt. 1990 m., Oct. 1932, *Hinton* 2331; on hill, Ixtapan, same District, alt 1000 m., 1 Nov. 1932, *Hinton* 2471; Bejucos, same District, alt. 610 m., 9 Nov. 1932, *Hinton* 2534.

In the type, which is much more mature than the other collections, the wings are rosy fading to whitish; in the other collections the wings are white or barely pink-tinged. The species is an addition to the small group in the series *Tenues* (subgenus *Orthopolygala*) consisting of *P. gracillima* S. Wats. and *P. decidua* Blake, in both of which, as in the new species, the seed is glabrous. *Polygala decidua* is readily separated by its much larger seed (1.2 mm. long), deciduous bracts, and looser racemes, in addition to other characters. *P. gracillima*, which looks like a miniature of the new species, is distinguished by its more slender racemes (only 2-3 mm. thick), its smaller flowers (1.5 mm. long or less), its considerably smaller seed (0.5 mm. long), and the possession of 6 stamens instead of 8. The shape of its capsule and stipe is the same as in *P. hintonii*.

PROCEEDINGS  
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CONCERNING NEOTROPICAL SPECIES OF  
RHAGOVELIA (VELIIDAE : HEMIPTERA).

BY C. J. DRAKE AND H. M. HARRIS.

Ames, Iowa.

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Further work with collections of Neotropical water-striders belonging to the genus *Rhagovelia* Mayr necessitates several synonymical changes and the recognition of three species and a variety as new to science. Types of the new forms are in the collection of the authors, paratypes have been deposited in the U. S. National Museum.

1. *Rhagovelia amazonensis* Gould.

*Rhagovelia amazonensis* Gould, Sci. Bull., Univ. Kan., 20 : 15, 1931.

*Rhagovelia williamsi* Gould, Sci. Bull., Univ. Kan., 20 : 47, 1931.

A careful study of paratypes (male and female) of *R. williamsi* Gould shows them to be inseparable from *R. amazonensis*. The posterior tibia is armed at the apex with a distinct spur. The hind trochanters are spinose in the male. The "carina" mentioned in the original description as occurring on the first genital segment of the female is in reality a suture separating the two genital flaps. In the females of *amazonensis* the apex of each connexivum is thickly beset with bristly hairs; in the paratype of *williamsi* these hairs are present but are so matted together as to appear like spines and were erroneously described as such in the original description. The patch of long hairs on the second connexival segment is quite characteristic.

2. *Rhagovelia armata* Burmeister.

Specimens, apterous and winged, are at hand from Guatemala. In addition examples have been seen from Guadeloupe, West Indies, and Colima, Mexico. As in several other members of the genus the incrassation of the hind femora varies greatly in a series of specimens. Coupled with this there is considerable diversity in the character of the armature of both femora and tibiae. In specimens with greatly enlarged femora the tibiae are strongly sinuately bowed and are somewhat flattened and widened



within and armed with stouter teeth along the distal third. In specimens with slightly swollen femora the hind tibiae frequently are perfectly straight. The pronotum of apterous individuals is more sharply rounded behind in the male than in the female.

### 3. *Rhagovelia callida*, n. sp.

*Apterous form*: Moderately large, grayish black, clothed with short brownish pile, the long bristly hairs darker, very sparse above, longer and not numerous on the sides. Body beneath with a bluish lustre. Connexiva with black and somewhat shiny margins. Anterior and posterior coxae and margins of acetabula, trochanters and basal fourth of antennae flavous to stramineous. Legs black, somewhat shiny, the tibiae and tarsi brownish black.

Pronotum short, transverse, not produced behind. Mesonotum similar to *R. velocis*, n. sp. Head with usual markings, eyes brownish black. Antennae moderately large; proportions, 28 : 16 : 17 : 15.

*Male*: Hind femora moderately incrassated, sharply reduced a little before apex, armed within with a single row of short stout blunt teeth on the distal two-fifths; tibiae slightly curved, indistinctly denticulate within, with a spur at apex. Intermediate legs, 58 : 37 : 23 : 20. Metasternum and venter ridged along the median line, the ridge very broad on the metasternum, narrowing posteriorly and becoming very narrow on last two segments and clothed with long hairs. Last genital segments beneath and a spot on last two to four tergites black, slightly shiny, the spots on tergites becoming larger posteriorly.

*Female*: Connexiva broad and rounded at the apex, there clothed with long brown hairs; the last three or four tergites with black spots, the first two of which are smaller. Hind femora faintly enlarged, with short, stout black spines on apical third, the first tooth considerably more prominent than others. Abdomen tumid beneath, the last venter slightly shorter than the two preceding, roundly produced at the middle behind.

Length, 3.80–4.10 mm., width, 1.50–1.60 mm.

*Holotype*, male, *allotype*, female, Rio Rimac, Lima, Peru, Sept. 1933. *Paratypes*, males and females, taken with type and at La Merced, Junin, Peru, Nov. 1933. This insect is not easily confused with any described species. The ventral ridge and the nature of the posterior femora and their armature are distinguishing characters. Winged forms are unknown.

### 4. *Rhagovelia calopa* D. & H.

*Calopa* often occurs in great abundance in Honduras. The type is from Guatemala. In the female there is a conspicuous brownish spot along the upper margin of each connexival segment, occasionally absent on first two segments. The incrassation of the femora varies greatly in different specimens. In the winged form (male and female) the pronotum marked as in apterous, triangular behind, more strongly arched across the disc, with a faint median longitudinal carina, and with a few scattered punctures on the triangular portion.

5. *Rhagovelia gregalis* D. & H.

*Rhagovelia gregalis* D. & H., Proc. Biol. Soc. Wash., 40 : 136, 1927.

*Rhagovelia obscura* Gould, Science Bull., Univ. of Kan., 20 : 38, 1931.

In addition to the types, from Honduras, specimens are at hand from Guatemala and Peru. The hind tibia is armed at the tip with a small spur and in the male is minutely serrate within. The tibial spur is somewhat variable in size and often is quite inconspicuous. A reexamination of the types of *gregalis*, after they were relaxed and cleaned, shows that they also possess these characters and that the original description in regard to this was in error. A comparison of the types of *gregalis* D. & H. and *obscura* Gould proves that the two names apply to the same species.

6. *Rhagovelia longipes* Gould.

*Apterous form*: Grayish black, clothed with numerous long hairs. Pronotum very short, not produced over mesonotum, about three times as wide as long, with a transverse brownish spot near the front margin. Mesonotum very large, considerably arched. Metanotum mostly concealed above. Abdomen above with a bluish tinge. Hairs on abdomen longer in male than in female, the former with conspicuous long hairs on genital segments. Base of antennae, coxae and trochanters of anterior and posterior legs, margins of all acetabula, and small basal portion of front and sometimes hind femora flavous to flavo-testaceous. Proportional measurements of the appendages agree with those given in the original description.

Several hundred specimens, apterous and winged males and females, Rio Paucartambo, Quiroz, Peru, Dec. 1933. In the winged form the pronotum is conspicuously punctured in front of the hind margin.

7. *Rhagovelia plumbea* Uhler.

*Rhagovelia plumbea* Uhler, Proc. Zool. Soc. Lond., 1894, p. 217.

*Trochopus maritimus* Carpenter, Ent. Mo. Mag., 24 : 78, 1898.

*Rhagovelia salina* Gould (*nec* Champ.), Sci. Bull., Univ. Kan., 20 : 41, 1931.

A common species in brackish waters along the southern-most points of Florida and nearby islands, West Indies and Central America. Specimens from the type series have been examined. The winged form is not known. Long series exhibit some variation in color. The specimens in the University of Kansas collection, labelled by Gould as *salina* Champion, are referable to this species.

8. *Rhagovelia regalis*, D. & H.

*Rhagovelia regalis* Drake & Harris, Proc. Biol. Soc. Wash., 40 : 137, 1927.

*Rhagovelia confusa* Gould, Sci. Bull., Univ. Kan., 20 : 23, 1931.

In addition to the type series from Honduras numerous specimens from Punta Gorda, Br. Honduras, are at hand. This insect is most closely allied to *gregalis* D. & H. from which it may be separated by the less arched mesonotum and the slightly shorter legs. The connexivum of the female

is wider at the apex than in *gregalis*. An examination of the types of *R. confusa* Gould in the collections of the University of Kansas discloses that they are inseparable from *R. regalis* D. & H.

9. *Rhagovelia relictæ* Gould.

Several apterous males and females, Rio Branco, Minas Geraes, Brazil. The series exhibits considerable variation in color, some specimens being brown with paler markings and agree well with the original description; others range in general color from dark brown to black with light markings. The species is very close to if not identical with *R. robusta* Gould as represented by a paratype before us.

10. *Rhagovelia sinuata* var. *calcaris*, n. var.

Size, form and color very similar to typical *sinuata*. Hind femora of males varying in size, frequently enormously incrassate; hind tibiae moderately to strongly bowed, denticulate within and armed with a moderate to enormous spur a little in front of the apex. Short spines of femora and tibiae blunt. Hind trochanter also with short spines.

*Holotype*, apterous male, *allotype*, apterous female and *paratypes*, numerous apterous males and females, Rio Paucartambo, Quiroz, Peru, Dec. 1933; in authors' collection.

As the claspers are very similar to those of *R. sinuata*, it seems best to treat this form as a variety. The males may be recognized at a glance by the presence of the spur on the tibia.

11. *Rhagovelia spinigera* Champion.

*Apterous form*: Pronotum coarsely, deeply punctured, indistinctly carinate down the middle, rounded behind in the male, in the female very broadly rounded, almost subtruncate; practically covering mesonotum. Connexiva in the male moderately broad, margined with brown, blackish at base and apex; in the female strongly reflexed over the posterior part of abdomen, its apex broadly rounded, sometimes smooth, sometimes conspicuously clothed with long hairs, basal three-fifths of margin yellowish brown, the reflexed portion mostly brownish black.

One of the commonest species in Central America and Mexico. The intermediate femora are constricted only in female individuals.

12. *Rhagovelia tenuipes* Champion.

Specimens are at hand from Honduras, Guatemala and Mexico. The shorter and stouter legs and the armed hind femora separate this species at once from *longipes* Gould.

13. *Rhagovelia velocis*, n. sp.

*Apterous form*: Moderately large, grayish black, clothed with short grayish-brown pile and numerous long dark hairs. Body beneath and sides with a bluish luster. The narrow margin of connexiva, a spot on last tergite, a rectangular spot on last venter, and genital segments jet-black and somewhat shiny. Pronotum short, transverse, not extending back on

mesonotum; with a prominent, transverse, yellowish brown spot near the front margin. Mesonotum large, moderately arched, narrowed posteriorly, subtruncate behind. Head with the usual black spots and line-impressions. Eyes moderately large, dark brown. Antennae moderately long, blackish, the basal two-fifths of first segment flavous, segments I and II with a few long seta-like hairs; proportions, 20 : 11 : 11 : 10.

Rostrum short, shiny, brownish black, the sides of the basal segment, the second segment and the bucculae brownish. Legs black, the basal half of anterior femora and the front and hind coxae and trochanters flavous to stramineous; intermediate coxae and trochanters black. Margins of acetabula more or less embrowned. Tarsi brownish black, legs clothed with numerous long black hairs and with grayish pile. Abdomen beneath clothed with numerous whitish hairs.

*Macropterous form*: Pronotum very large, indistinctly carinate down the middle, strongly convex above, distinctly punctate, the punctures conspicuous on posterior portion; humeri moderately prominent; color similar but the long hairs not as numerous as in apterous form. Hemelytra dark brown, the nervures darker, moderately prominent, clothed with coarse hairs; extending beyond apex of abdomen.

*Male*.—Hind femora moderately incrassate, only slightly thicker than the intermediate, armed within near the middle with a conspicuous spine and from there to apex with several minute spines in a row. Genital segments moderately hairy (long and short); the clasper short, thicker at base, slightly bent. Intermediate legs, 42 : 29 : 17 : 17.

*Female*.—Larger than male, connexiva considerably broader, widest near the middle, narrowed toward apex and there clothed with numerous long, brown hairs. Posterior femora with a short spine beyond the middle and a few inconspicuous spines between there and apex.

Length, 3.25–3.55 mm.; width, 1.25–1.75 mm.

*Holotype*, apterous male, *allotype*, female, *morphotype*, winged male, and *paratypes*, males and females, La Merced, Junin, Peru, November, 1933. This species is most closely allied to *R. versuta*.

#### 14. *Rhagovelia versuta*, n. sp.

General aspect very similar to *velocis*, n. sp., but larger and with the legs entirely black. Antennae, 23 : 13 : 14 : 14. Body clothed with long hairs, beneath with a bluish luster. Hind tibia with apical spur. Posterior femora of male faintly incrassate, with a prominent, sharp spine near the middle and a row of short spines from there to apex. Intermediate legs, 48 : 35 : 21 : 20. Male clasper small, dark brown, curved toward the apex.

Length, 3.65–4.00 mm.; width, 1.60–1.80 mm.

*Holotype*, male, and *allotype*, female, Rio Paucartambo, Quiroz, Peru, Dec. 1933. *Paratypes*, several specimens taken with types.

On account of the uniformly larger size and the color of the fore femora it seems desirable to treat this form as a distinct species rather than as a variety of *R. velocis*, n. sp. Four somewhat mutilated females from Pampas Grande, Prov. Salta, Argentina, and belonging to the Vienna Museum, apparently are referable to this species.









# PROCEEDINGS

OF THE

## BIOLOGICAL SOCIETY OF WASHINGTON

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### NEW ARIZONA PLANT NAMES.

BY IVAR TIDESTROM.

In view of the proposed issuance in mimeographed form of Keys to the Flora of Arizona, it has seemed desirable to publish separately the new names contained in the manuscript.<sup>1</sup>

**Allium mohavense** (Jepson) Tidestrom.

*Allium fimbriatum mohavense* Jepson, Man. Fl. Pl. Calif. 218. 1923.

**Abronia wootoni** (Standl.) Tidestrom.

*Tripterocalyx wootoni* Standl. Contr. U. S. Nat. Herb. 12: 329. 1909.

**Epibaterium diversifolium** (DC.) Tidestrom.

*Cocculus diversifolius* DC. Reg. Veg. Syst. 1: 523. 1818.

*Cocculus oblongifolius* DC. Reg. Veg. Syst. 1: 529. 1818.

*Cebatha diversifolia* Kuntze, Rev. Gen. Pl. 1: 9. 1891.

**Sophia diffusa** (A. Gray) Tidestrom.

*Sisymbrium diffusum* A. Gray, Pl. Wright. 1: 8. 1852.

*Halimolobus diffusus* O. E. Schulz, Pflanzenr. IV. 105: 288. 1924.

**Cleome jonesii** (Macbride) Tidestrom.

*Cleome lutea jonesii* Macbride, Contr. Gray Herb. 65: 39. 1922.

**Petrophytum caespitosum elatius** (S. Wats.) Tidestrom.

*Spiraea caespitosa elatior* S. Wats. in King, Geol. Expl. 40th Par. 5: 81. 1871.

*Petrophytum elatius* Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.

**Potentilla macdougalii** Tidestrom, nom. nov.

*Potentilla arizonica* Rydb. N. Amer. Fl. 22: 373. 1908. Not *P. arizonica* Greene, 1887.

**Prunus rufula** (Woot. & Standl.) Tidestrom.

*Padus rufula* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 132. 1913.

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<sup>1</sup> For a number of years Mr. Ivar Tidestrom, formerly of the Bureau of Plant Industry, U. S. Department of Agriculture, has been at work on a Flora of Arizona. Arizona is now the only far western State for which no botanical manual is available. At the request of the federal Forest Service, it has been decided to mimeograph the keys of this manuscript, so far as they have been prepared, in order to make them immediately available.

—Frederick V. Coville.

***Acacia shrevei* (Britt. & Rose) Tidestrom.**

*Acaciella shrevei* Britton & Rose, N. Amer. Fl. **23**: 105. 1928.

***Parosela villosa* (Rydb.) Tidestrom.**

*Thornbera villosa* Rydb. N. Amer. Fl. **24**<sup>2</sup>: 118. 1920.

***Cracca constricta* (S. Wats.) Tidestrom.**

*Tephrosia constricta* S. Wats. Proc. Amer. Acad. **24**: 46. 1889.

*Sphinclospermum constrictum* Rose, Contr. U. S. Nat. Herb. **10**: 107. pl. 34. 1906.

***Astragalus yuccanus* (Jones) Tidestrom.**

*Astragalus lentiginosus yuccanus* Jones, Contr. West. Bot. **8**: 3. 1898.

*Cystium yuccarum* Rydb. N. Amer. Fl. **24**<sup>6</sup>: 407. 1929.

***Astragalus mollissimus earlei* (Greene) Tidestrom.**

*Astragalus humboldtii* Jones, Rev. Astragal. 232. 1923. Not *A. humboldtii* A. Gray, 1864.

*Astragalus earlei* Greene; Rydb. N. Amer. Fl. **24**<sup>8</sup>: 444. 1929.

***Astragalus gooddingii* (Rydb.) Tidestrom.**

*Hamosa gooddingii* Rydb. Bull. Torrey Club **54**: 20. 1927.

***Astragalus amphioxys melanocalyx* (Rydb.) Tidestrom.**

*Xylophacos melanocalyx* Rydb. Bull. Torrey Club **52**: 149. 1925.

*Xylophacos tidestromii* Rydb. Bull. Torrey Club **52**: 155. 1925.

***Astragalus curtilobus* Tidestrom, nom. nov.**

*Astragalus shortianus brachylobus* A. Gray, Proc. Amer. Acad. **13**: 367. 1878. Not *A. brachylobus* DC. 1825.

*Xylophacos brachylobus* Rydb. Bull. Torrey Club **52**: 154. 1925.

***Astragalus chloridæ* (Jones) Tidestrom.**

*Astragalus remulcus chloridæ* Jones, Rev. Astrag. 210. 1923.

*Xylophacos chloridæ* Rydb. Bull. Torrey Club **52**: 153. 1925.

***Astragalus blyæ* (Rose) Tidestrom.**

*Xylophacos blyæ* Rose, N. Amer. Fl. **24**<sup>6</sup>: 303. 1929.

***Croton mohavensis* (Ferguson) Tidestrom.**

*Croton californicus mohavensis* Ferguson, Rep. Mo. Bot. Gard. **12**: 65. 1901.

***Euphorbia chaetocalyx* (Boiss.) Tidestrom.**

*Euphorbia fendleri chaetocalyx* Boiss. in DC. Prodr. **15**<sup>2</sup>: 39. 1862.

*Chamaesyce chaetocalyx* Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 144. 1913.

***Euphorbia indivisa* (Engelm.) Tidestrom.**

*Euphorbia dioica indivisa* Engelm. in Torr. U. S. & Mex. Bound. Bot. 187. 1859.

*Chamaesyce indivisa* Millsp. Field Mus. Bot. **2**: 387. 1916.

**Euphorbia philora** (Cockerell) Tidestrom.

*Euphorbia montana* Engelm. in Torr. U. S. & Mex. Bound. Bot. 192. 1859.  
Not *E. montana* Raf. 1817.

*Tithymalus philorus* Cockerell, Muhlenbergia 4: 56. 1908.

**Euphorbia yaquiana** Tidestrom, nom. nov.

*Euphorbia mollis* Engelm. in Patterson, Check-list 114. 1887. Not *E. mollis* Gmelin, 1806.

*Euphorbia schizoloba mollis* Norton, Rep. Mo. Bot. Gard. 11: 127. 1899.

**Sphaeralcea scoparia** (L'Hér.) Tidestrom.

*Malva scoparia* L'Hér. Stirp. Nov. Pl. 27. 1784.

*Malvastrum scoparium* A. Gray, U. S. Expl. Exped. 15: 147. 1854, in text.

**Oenothera simplex** (Small) Tidestrom.

*Oenothera ambigua* S. Wats. Proc. Amer. Acad. 14: 293. 1879. Not Spreng. 1825.

*Anogra simplex* Small, Bull. Torrey Club 23: 175. 1896.

**Oenothera runcinata** (Engelm.) Tidestrom.

*Oenothera albicaulis runcinata* Engelm. Amer. Journ. Sci. II. 34: 334. 1862.

*Anogra runcinata* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 151. 1913.

**Oenothera neomexicana** (Small) Tidestrom.

*Anogra neomexicana* Small, Bull. Torrey Club 23: 176. 1896.

**Oenothera taraxacoides** (Woot. & Standl.) Tidestrom.

*Lavauria taraxacoides* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 155. 1913.

**Oenothera toumeyii** (Small) Tidestrom.

*Galpinsia toumeyii* Small, Bull. Torrey Club 25: 317. 1898.

**Oenothera veitchiana** (Hook.) Tidestrom.

*Oenothera graciliflora* Torr. U. S. Rep. Expl. Miss. Pacif. 4: 87. 1857. Not *O. graciliflora* Hook. & Arn. 1840.

*Oenothera bistorta veitchiana* Hook. in Curtis' Bot. Mag. 84: pl. 5078. 1858.

*Sphaerostigma veitchiana* Small, Bull. Torrey Club 23: 191. 1896.

**Oenothera phlebophylla** Tidestrom, nom. nov.

*Chylismia venosa* Nels. & Kennedy, Muhlenbergia 3: 140. 1908. Not

*Oenothera venosa* Shull & Bartlett, Amer. Journ. Bot. 1: 241. pl. 19. f. 2. 1914.

**Oenothera watsoni** Tidestrom, nom. nov.

*Oenothera brevipes parviflora* S. Wats.; Parry, Amer. Nat. 9: 271. 1875. Not *O. parviflora* L. 1759.

*Chylismia parviflora* Rydb. Fl. Rocky Mount. 603. 1917.

**Cymopterus multinervatus** (Coult. & Rose) Tidestrom.

*Cymopterus purpurascens* Jones, Proc. Calif. Acad. II. 5: 687. 1895. Not *C. montanus purpurascens* A. Gray, 1860.

*Phellopterus multinervatus* Coult. & Rose, Contr. U. S. Nat. Herb. 7: 169. 1900.



**Cymopterus maddougli** (Coul. & Rose) Tidestrom.

*Aletes* (?) *maddougli* Coul. & Rose, Contr. U. S. Nat. Herb. **7**: 107. 1900.  
*Oreoxis maddougli* Rydb. Bull. Torrey Club **40**: 68. 1913.

**Cymopterus ligusticoides puniceus** Tidestrom, nom. nov.

*Pseudocymopterus montanus purpureus* Coul. & Rose, Rev. Umbell. **75**.  
1888.  
*Pseudocymopterus purpureus* Rydb. Bull. Torrey Club **33**: 147. 1906. Not  
*Cymopterus purpureus* S. Wats. 1873.  
*Cymopterus ligusticoides purpureus* Jones, Contr. West. Bot. **12**: 29. 1908.

**Cymopterus tenuifolius** (A. Gray) Tidestrom.

*Thaspium montanum tenuifolium* A. Gray, Pl. Wright. **2**: 65. 1853.  
*Pseudocymopterus tenuifolius* Rydb. Bull. Torrey Club **33**: 147. 1906.  
*Cymopterus ligusticoides tenuifolius* Jones, Contr. West. Bot. **12**: 29. 1908.

**Centaurium calycosum arizonicum** (A. Gray) Tidestrom.

*Erythraea calycosa arizonica* A. Gray, Syn. Fl. **2**: 113. 1878.  
*Centaurium arizonicum* Heller, Muhlenbergia **4**: 86. 1908.

**Asclepias emoryi** (Greene) Tidestrom.

*Podostemma emoryi* Greene, Pittonia **3**: 237. 1897.

**Welwitschia filifolia diffusa** (A. Gray) Tidestrom.

*Gilia filifolia diffusa* A. Gray, Proc. Amer. Acad. **8**: 272. 1870.

**Leptodactylon floribundum** (A. Gray) Tidestrom.

*Gilia floribunda* A. Gray, Proc. Amer. Acad. **8**: 267. 1870.  
*Leptodactylon nuttallii floribundum* Jepson, Man. Fl. Pl. Calif. **808**. 1925.

**Leptodactylon pungens squarrosus** (A. Gray) Tidestrom.

*Gilia pungens squarrosa* A. Gray, Proc. Amer. Acad. **8**: 268. 1870.  
*Leptodactylon patens* Heller, Muhlenbergia **1**: 146. 1906.

**Nyctelea membranacea** (Benth.) Tidestrom.

*Ellisia membranacea* Benth. Trans. Linn. Soc. **17**: 274. 1837.

**Nyctelea torreyi** (A. Gray) Tidestrom.

*Phacelia micrantha bipinnatifida* Torr. in Ives, Rep. Colo. River. **21**. 1860.  
*Ellisia torreyi* A. Gray, Proc. Amer. Acad. **20**: 302. 1865.  
*Macrocalyx bipinnatifidus* Coville, Contr. U. S. Nat. Herb. **4**: 157. 1893.

**Heliotropium curassavicum oculatum** (Heller) I. M. Johnston.

*Heliotropium oculatum* Heller, Muhlenbergia **1**: 58. 1904.

**Cryptantha jamesii setosa** (Jones) I. M. Johnston.

*Krynitzkia multicaulis setosa* Jones, Contr. West. Bot. **13**: **4**. 1910.  
*Hemisphaerocarya suffruticosa setosa* Brand in Fedde, Repert. **24**: 60. 1927.

**Lippia incisa** (Small) Tidestrom.

*Phyla incisa* Small, Fl. Southeast. U. S. **1012**. 1903.

***Antirrhinum flaviflorum dentatum*** Tidestrom, nom. nov.

*Maurandia acerifolia* Pennell, Journ. Washington Acad. Sci. **19**: 69. 1929.

The leaves of this species are deeply toothed, scarcely lobed; their resemblance to maple leaves is rather remote.

***Agalinis wrightii*** (A. Gray) Tidestrom.

*Gerardia wrightii* A. Gray in Torr. U. S. & Mex. Bound. Bot. **118**. 1859.

***Megarrhiza macrocarpa*** (Greene) Tidestrom.

*Echinocystis macrocarpa* Greene, Bull. Calif. Acad. **1**: 188. 1885.

*Micrampelis macrocarpa* Greene, Pittonia **2**: 129. 1890.

*Marah macrocarpus* Dunn, Kew Bull. Misc. Inform. **1913**: 152. 1913.

In 1862 Naudin (Annales des Sciences Naturelles, ser. 4. **16**: 188) discussed the nomen nudum, *Megarrhiza californica* Torr. (U. S. Rep. Expl. Miss. Pacif. **6**: 14. 1857; **7**: 11. 1857), and placed it as a synonym of his own species, *Echinocystis fabacea*. At first sight this would seem to justify Greene's action (Leaflets **2**: 35-36. 1910) in rejecting the generic name *Megarrhiza* and adopting in lieu thereof *Marah* Kellogg (1863). Naudin, however, has clearly indicated the type of *Megarrhiza* Torr. & Gray and has stated the characters by which it differs from the species of *Echinocystis* of eastern United States. This characterization has impelled the writer to take up the name given by Torrey in 1857, and defined by Naudin in 1862. The genus *Megarrhiza* has been carefully defined by Sereno Watson in Proceedings of the American Academy (**11**: 138. 1876) and in the Botany of California (**1**: 240. 1876).









PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW GENUS AND TWO NEW SPECIES OF  
DICTYNIDAE (ARANEAE).

BY S. C. BISHOP AND C. R. CROSBY.

---

The spider family Dictynidae has two series of genera, the one represented by Amaurobius and the other by Dictyna, the transition being found in Lathys, Scotolathys and Derade. Both series are well represented in America. In the Amaurobius series, however, there is a group of species in eastern North America which, because of their close relationship to each other and peculiar structural features, form a compact group that should be separated from the more typical species.

**Callioplus**, new genus.

Type, *Amaurobius hoplites* Bishop and Crosby.

Closely related to Amaurobius, from which it is distinguished by the remarkable development of the tibial apophysis of the male palpus and by the form of the epigynum. The cribellum may be entire or partially divided. For the characters of the palpus and the epigynum see the description of the type species. (Jour. Elisha Mitchell Sci. Soc. 41 : 171, pl. 21, fig. 12-14, 1926).

In this genus we also place the following: *Amaurobius tibialis* Em., *A. hoplomachus* B. and C., *A. armipotens* B. and C., and the two following new species.

**Callioplus euoplus**, n. sp.

Figs. 1-3.

*Male*.—Length, 5 mm. Our single male specimen is somewhat teneral. The cephalothorax is dull yellowish, with darker radiating lines. Anterior eyes in a slightly procurved line, the median much smaller than the lateral, separated by the diameter and a little farther from the lateral. Posterior eyes in a straight line, the median a little smaller than the lateral, separated by three times the radius and a little farther from the lateral. Clypeus as wide as the diameter of an anterior lateral eye.

Sternum yellowish, suffused with dusky. Labium and endites dusky orange-yellow, lighter distally. Legs generally yellowish, lightly suffused with dusky; femora dark at base below. Chelicerae yellow-orange; lower margin of the furrow armed with three small teeth.

Abdomen above dusky, marked with a double row of pale spots decreasing in size posteriorly. Cribellum divided.

Tibia of palpus hollowed out and produced dorsally into three long processes of which the one lying closest to the cymbium is the longest; it is broad, thin, folded toward the tip and provided with a broad rounded lobe laterally near the middle. The middle process is much shorter than the others, thin, flat, and pointed at tip. The third process is broad at base, narrowed near the middle where it makes a right-angled bend; the tip is broad, flat, bluntly pointed and lies across the first process. The distal lateral angle of the tibia is strongly produced and widened distally, the inner angle lying under the edge of the cymbium. Between the dorsal and lateral processes there is a small, dark, triangular tooth.

*Female*.—Length, 4.5–5.5 mm. The females are more maturely colored. The head is lighter than the rest of the cephalothorax; the epigynum has the lateral lobes broadly approximate in a straight line, in front of which there is a large, transversely oval, opening.

This species is more closely related to *C. tibialis* than to the other species of the genus.

*Holotype*, male, *allotype*, female, Molunkus Pond, Me., Aug. 25, 1925.

Maine: Presque Isle, Aug. 26, 1925, 1 ♀; Sebasticook Lake, Aug. 24, 1925, 2 ♀.

Quebec: Ile d'Alma, Lac St. Jean, July 28, 1934, 1 ♀; Bagotville, July 26, 1934, 2 ♀.

### ***Callioplus pantoplus*, n. sp.**

Figs. 4–6.

*Male*.—Length, 4 mm. Cephalothorax dusky orange, smooth and shining. Anterior eyes in a slightly procurved line, the median smaller than the lateral, separated by the diameter and from the lateral by three times the radius. Posterior eyes in a nearly straight line, equal, the median separated by a little less than the diameter and from the lateral by a little more than the diameter. Width of clypeus a little less than the diameter of an anterior lateral eye.

Sternum yellowish orange, lightly suffused with dusky, darker at the margin. Labium and endites dusky orange, lighter distally. Legs grayish orange. Chelicerae brown, lower margin of the furrow armed with four small teeth on one side and five on the other. Abdomen gray with a double row of small pale spots. Cribellum with a faint indication of division posteriorly.

Tibia of palpus hollowed out and produced dorsally into a very long, slender, curved, sickle-shaped process, the tip flattened and marked by transverse ridges. This process is armed on the lateral side with a long, slender, incurved tooth much as in *hoplites* and *hoplomachus* but much

longer and more slender. The distal lateral angle broadly produced and hooked as in *hoplites*, the dorsal triangular process almost as in that species.

*Female*.—Length, 3.5 mm. Similar to the male in form and color but average smaller. The epigynum has the lateral lobes rounded behind, more pointed than in *hoplites*. The lobes are narrowly separated and the opening in front is elongate oval.

*Holotype* male, *allotype* female, Laurel Creek, Sevier Co., Tenn., Oct. 8, 1926. 2 ♂ and 2 ♀ paratypes from the same lot.

Tennessee: Mill Creek, below the falls, Mt. Leconte, Oct. 10, 1926. 1 ♂ 2 ♀.

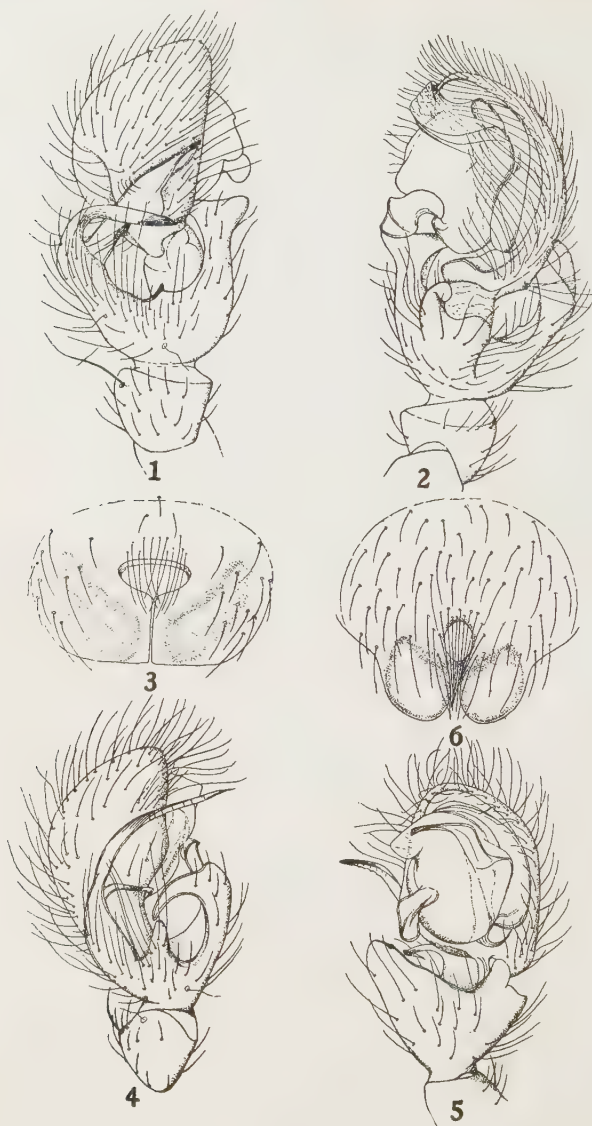


FIG. 1. *Callioplus euoplus* ♂, right palpus, dorsal view.  
 FIG. 2. *Callioplus euoplus* ♂, right palpus, mesal view.  
 FIG. 3. *Callioplus euoplus* ♀, epigynum.  
 FIG. 4. *Callioplus pantoplus* ♂, right palpus, dorsal view.  
 FIG. 5. *Callioplus pantoplus* ♂, right palpus, mesal view.  
 FIG. 6. *Callioplus pantoplus* ♀, epigynum.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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PRELIMINARY DESCRIPTIONS OF SIX NEW SPECIES  
OF CRABS FROM THE PACIFIC COAST OF  
AMERICA.

BY MARY J. RATHBUN.<sup>1</sup>

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The material here described was collected by Dr. Waldo L. Schmitt in 1926 under the Walter Rathbone Bacon fund, with one exception, that of a fiddler crab obtained by Dr. Elisabeth Deichmann.

FAMILY XANTHIDAE.

*Daira ecuadorensis*, sp. nov.

*Type*.—Male, U. S. National Museum Cat. No. 70828, Salinas, Ecuador.

Posterior third of carapace nearly smooth; remainder covered with large tubercles not ball-shaped as in *americana* and *perlata*, but furnished with a blunt transverse ridge. Tubercles arranged in irregularly transverse rows (5 in the middle lines) and 8 longitudinal rows. Mesogastric region reaches only to anterior third of carapace. Antero-lateral margin with about 10 small, irregular, pointed teeth. Posterior carapace bounded anteriorly by a broken ridge; above the hind margin a sharp rim divided at middle by a narrow gap. Inner pair of frontal teeth with a marginal arch and divided by a narrow gap. Chelipeds tuberculate above, smooth below; 4 rows on manus of 4 or 5 tubercles each. Fingers black, sharply ridged, color continued slightly on manus with an oblique line. Length of carapace 5.5, width 8 mm.

FAMILY GONEPLACIDAE.

*Cyrtoplax schmitti*, sp. nov.

*Type*.—Male, U. S. National Museum Cat. No. 70829, Salinas, Ecuador.

The Pacific counterpart of *C. spinidentata*. Margin of frontal lobes more arcuate. Antero-lateral teeth less prominent; first tooth very slightly convex, not divided into 2 lobes; next tooth posteriorly rounded and separated from the first by a small triangular gap; third tooth subquadri-lateral, well separated from second and having a sharp angle directed

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<sup>1</sup> Published with the permission of the Secretary of the Smithsonian Institution.



forward; outer line longitudinal, posterior angle rounded and followed by a small triangular incision and pointed tooth. Chelipeds very unequal. One spine on merus, one on carpus; palm of major chela nearly as high as its middle length, lower margin convex, upper margin subacute and obscurely granulate. Fingers narrowly gaping; fixed finger broad at base and flat, curving downward except at extremity where it is upturned and crosses tip of dactylus; dactylus narrow, gradually tapering, armed with low teeth, the proximal tooth larger. Third abdominal segment nearly reaching margin of sternum. Surface of body and ambulatories covered with setae, with scattered hairs on margins of legs. Length of carapace 15.4, width 22 mm.

FAMILY PINNOTHERIDAE.

*Pinnixa paitensis*, sp. nov.

*Type*.—Female immature, U. S. National Museum Cat. No. 70830, Paita, Peru.

Near *P. transversalis*. Carapace twice as wide as long, widest behind middle, lateral angle sloping downward; ridge across cardiac region blunt, obscure; in front of it a depression, and behind a convex slope the width of carapace. Surface smooth, faintly punctate. Rostrum with a deep median groove forming two arched and truncate teeth. An elongate propodus on outer maxilliped. Chelipeds short and stout, chelae and adjacent carpus hairy, obscuring fine rough granules on outer and upper surface of palm. Palm swollen, height equal to superior length; fingers stout, not gaping, fixed finger triangular, its lower margin horizontal. First leg as long as cheliped, slender; merus concave above, convex below, last 3 articles of subequal length, dactylus very slender, reaching end of propodus of second leg. This leg is wider, including dactylus, which is shorter and straight below and slightly arched above, reaching middle of propodus of third leg. Third very stout, merus twice as long as wide, rough below, carpus and propodus subequal in length above, dactylus triangular except for slender tip. Fourth leg similar but smaller, reaching end of merus of third leg, dactylus similar in shape to the preceding. Last 3 legs densely hairy below, especially the third and fourth. Length of carapace 3, width 6.2 mm.

FAMILY OCYPODIDAE.

*Uca guayaquilensis*, sp. nov.

*Type*.—Male, U. S. National Museum Cat. No. 70831, Salada, Guayaquil, Ecuador, in mangrove swamp.

Near *U. coloradensis*. Carapace shorter and broader; front narrower, at its widest much narrower than orbital margin; supraorbital surface narrower and less triangular. Anterior part of side margins straight or nearly so. Large chela of male similar to that of *coloradensis*; palm subtriangular, less abruptly turned inward above; granulation of outer surface less fine, a row of coarse granules parallel to groove at distal end and near by a small group of similar granules; on the inner surface the angle formed by the lines of tubercles is very prominent; fingers slender. Abdomen narrower than in *U. c.* Length of carapace 9.1, width 14.3 mm.

***Uca deichmanni*, sp. nov.**

*Type*.—Male, U. S. National Museum Cat. No. 70832, shore of Panama, low tide, rocks, May-July, 1924.

Near *U. stenodactylus*. Rostrum narrower, also the supraorbital surface. Upper part of outer surface of manus eroded in short, transverse grooves, the granules inserted chiefly on the intervening ridges. Palm broader in proximal half and lower margin more rounded than in *U. s.*; fingers less slender and shorter; fixed finger shorter than dactylus and tapering slightly at tip. Length of carapace 7.9, width 12 mm.

***Uca inaequalis*, sp. nov.**

*Type*.—Male, U. S. National Museum Cat. No. 70833, Salada, Guayaquil, Ecuador.

A small species, distinguished by its uneven carapace, which has 8 small elevations in 2 transverse rows of 4 each; they are accentuated by a covering of fine short hairs. A similar, although less evident elevation on each protogastric region. Carapace greatly narrowed behind; antero-lateral margin straight near orbit but soon turns abruptly inward. Chelipeds strikingly unequal; the minor one is shorter and thinner than any of the ambulatories; the major one stout, chela short; dactylus no longer than middle line of manus. Fixed finger triangular, with a tooth on distal half, a similar tooth a little further inward on dactyl; both fingers are hairy on inner surface from base up to tooth, and are longitudinally grooved outside and in. Inside of manus there is a blunt row of granules running obliquely upward and backward. Minor cheliped less than half as long as major and equally narrow throughout; fingers longer than palm and tips spooned. Length of carapace 8, width 11.2 mm.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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TWO NEW FORMS OF BIRDS FROM SOUTHEASTERN  
SIAM.<sup>1</sup>

BY J. H. RILEY,  
*United States National Museum.*

---

Further work upon the birds collected by Dr. Hugh M. Smith in Siam has revealed the two following forms, herewith described. The first is a woodpecker and the second a broad-bill, both birds of rather wide distribution.

***Cirropicus chlorolophus conjunctus*, subsp. nov.**

*Type*.—Adult male, U. S. National Museum, no. 333744, Kao Sabab, southeastern Siam, October 28, 1933. Collected by Hugh M. Smith (original no. 6561).

Similar to *Cirropicus chlorolophus chlorolophoides* (Gyldenstolpe) of northern Siam, but lighter above and below; the nuchal crest averaging a lighter yellow; averaging smaller, especially the bill. Wing 132; tail 85.5; culmen 26.5.

*Remarks*.—This form is founded on twelve specimens from eastern and southeastern Siam. They have been compared with ten males and twelve females from northern Siam and while the differences are not great, they are fairly constant. There is some overlapping in the measurements, but it is to be expected in closely related forms.

Six males of *C. c. conjunctus* measure: wing 127.5-137.5 (132.4); tail 80-90.5 (86.4); culmen 24.5-26.5 (25.7).

Ten males of *C. c. chlorolophoides* measure: wing 131.5-142 (135.8); tail 85-96 (89.9); culmen 24.5-30.5 (27.8).

Two males of *Cirropicus chlorolophus krempfi* (Delacour and Jabouille) from Trang Bom, Cochinchina, are similar to *C. c. conjunctus*, but the wings are somewhat smaller and the lower parts are darker. They measure: wing 126-129; tail 85-90; culmen 24.5-26.

The specimens of *C. c. conjunctus*, collected by Dr. Smith, are from the following localities: Lat Bua Kao; Pang Sok; Sak Keo, near Krabin; Nong Khor, near Sriracha; Huey Yang, Sriracha; Kao Seming, Krat; and Kao Sabab.

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<sup>1</sup> Published with the Permission of the Secretary of the Smithsonian Institution.

***Psarisomus dalhousiae cyanicauda*, subsp. nov.**

*Type*.—Adult male, U. S. National Museum, no. 333786, Kao Sabab, southeastern Siam, November 9, 1933. Collected by Hugh M. Smith (original number 6704).

Similar to *Psarisomus dalhousiae dalhousiae* from northern and western Siam, but darker, less yellowish green above; below the green has a bluish cast; tail darker, near Paris blue instead of Italian blue; the green edges to the outer webs of the outer tail-feathers reduced and confined to two or three feathers. Wing 97.5; tail 122.5; culmen 18.5.

*Remarks*.—In his two visits to Kao Sabab Dr. Smith secured five males and four females. This series has been compared with a series of nine males and four females from the northern part of its range (northern, central, and western Siam, and eastern Burma). There seems to be little difference in size between the two series. A male and female from Dran, southern Annam, is closer to this form than the northern bird and may provisionally be placed here.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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SYNOPSIS OF THE SPECIES OF BESLERIA IN  
ECUADOR.<sup>1</sup>

BY C. V. MORTON

---

The following key may prove of assistance in identifying material of *Besleria* (Gesneriaceae) from Ecuador. In the extensive collections at hand I have noted three new species, which are described in this paper. Through the courtesy of the directors I have been able to examine numerous specimens from the Royal Botanic Gardens, Kew, and the New York Botanical Garden.<sup>2</sup>

KEY TO SPECIES.

Corolla spurred at the base (subg. *Gasteranthus*).

Flowers solitary in the leaf axis.....1. *B. pansamalana* var. *ecuadorensis*

Flowers borne in pedunculate umbels.

Stems and leaves hirsute beneath; sepals toothed.....2. *B. quitensis*

Stems and leaves appressed-pubescent.

Ovary pubescent; disk annular, somewhat enlarged posteriorly.

Corolla glabrous; sepals not glandular.....3. *B. Oncogastra*

Corolla pilose; sepals glandular-pubescent.....4. *B. timida*

Ovary glabrous; disk reduced to a bilobed posterior gland;

corolla sparsely pilosulous .....5. *B. calceolus*

Corolla not spurred.

Calyx lobes united to above the middle (Subg. *Eubesleria*).

Flowers in pedunculate umbels.....6. *B. divaricata*

Calyx lobes free or united merely at base.

Common peduncle present.

Calyx lobes acuminate, conspicuously toothed; leaves

acuminate.....7. *B. rupestris*

Calyx lobes broad and obtuse, obsolete toothed; leaves

obtuse.....8. *B. corallinoides*

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<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.

<sup>2</sup> These institutions are abbreviated in the text, K and Y, respectively. The U. S. National Herbarium is indicated by W.

Common peduncle absent, the pedicels aggregate in the leaf axils.....9. *B. modica*  
 Dubious species.....10. *B. Sodiroana*

1. *Besleria pansamalana* var. *ecuadorensis* Fritsch, Notizbl. Bot. Gart. Berlin 11: 975. 1934.

The typical form of *B. pansamalana* Donn. Smith is confined to distant Guatemala. The occurrence of a variety in Ecuador was hardly to be anticipated, yet from the material at hand it is difficult to find any satisfactory marks of distinction which may be considered of specific importance.

The type of this variety was collected "In silvis subandinis prope Niebly (*Sodiro* n. 119/50)." The following additional specimens, all from the Province of Pichincha, have been seen:

ECUADOR: Corazón, *André* K 1494 (K); Chimborazo, *André* 751 (K); Mindo, *André* 3814 (K).

The specimen last cited bears the field note "flowers scarlet."

2. *Besleria quitensis* (Benth.) Hanst. Linnaea 34 : 334. 1865.

*Gasteranthus quitensis* Benth. Plant. Hartw. 233. 1846.

Fritsch<sup>3</sup> discusses *B. quitensis* and compares it with *B. Oncogastra*. It seems to me, however, to be nearer *B. Sodiroana* Fritsch; in fact, from description I am unable to separate the two, satisfactorily. *B. quitensis* is known also from southern Colombia.

The type was collected "In declivitate occidentali Andium Quitensium versus Nanegal," Ecuador, by Hartweg (s. n.). The following specimens of this species have been examined: San Pablo, *André* K 1487 (K); Mindo, *André* K 1489 (K); San Florencio, *André* K 1493 (K, Y).

The last specimen gives the flower color as "aurantiaca."

3. *Besleria Oncogastra* Hanst. Linnaea 34 : 335. 1865.

The present species appears to be fairly common in Ecuador. Hanstein's citation of the original specimens is as follows: "Quito? Huayaquil: Ruiz desc. n. 265; Warszewicz?" I have seen the following material:

ECUADOR: Río de Santa Rosa, *André* 4270 (K); Ayabamba, *André* K1495 (K, Y); Tambo Grande, *André* 4278 (K, Y); Chacayacu, alt. 300-600 meters, *Lehmann* 6462 (W). Between Santa Rosa and La Chorita, Prov. Oro, *Hitchcock* 21121 (Y, W).

4. *Besleria timida* Morton, sp. nov.

Subg. *Gasteranthus*. Caules graciles, superne strigillosi, inferne glabri, evidenter angulati, ca. 3 mm. diametro; lamina foliorum elliptico-lanceolata, maxima 9 cm. longa et 3 cm. lata, membranacea, apice acuminata, basi longe attenuata, in petiolum decurrens, vix denticulata, supra glabra, imprimis in nervis strigillosa, nervis secundariis 6 vel 7; petiolus strigillosus, usque ad 3 cm. longus; pedunculus communis crassus, usque ad 6 cm. longus, glaber; pedicelli simpliciter umbellati, glabri, breves, ca. 4 mm. longi; lobi calycis fere liberi, ca. 3.5 mm. longi, ovati, apice rotundati, paullulum mucronati, dense glanduloso-pubescentes, margine erosi, ciliati; corolla aurantiaca, ca. 16 mm. longa, evidenter pilosa, pronata, basi calcarata

<sup>3</sup> Notizbl. Bot. Gart. Berlin 11: 974. 1934.

(ca. 2 mm.), sursum abrupte ventricosa et ca. 1 cm. lata, fauce sursum spectante, ca. 6 mm. lata, lobis minutis, ca. 1 mm. longis; filamenta breviter; antherae parvae, connatae, loculis confluentibus; ovarium dense puberulum; discus annularis, pubescens, postice crassior.

Type in the Kew Herbarium, collected at Corazón (?), Province of Pichincha, Ecuador, June 20, 1876, by E. André (no. K1497). An additional Ecuador specimen in the Kew Herbarium is André 4876, collected at Balsapamba, Prov. Bolívar, July 11, 1876.

This is a very delicate and beautiful little plant, perhaps most nearly related to *B. calceolus* Fritsch, a species known to me from description only. That, however, has the corollas only sparsely pilosulous (rather than long-pilose), the ovary glabrous instead of conspicuously puberulous, and the disk reduced to a bilobed posterior gland. In *B. timida* the disk is annular and merely thickened a little posteriorly. The leaves of *B. calceolus* are considerably larger than those of *B. timida*.

5. *Besleria calceolus* Fritsch, in Repert. Nov. Sp. Fedde 18 : 12. 1922.

I have seen no material. The type was collected near Canelos, Ecuador, by Spruce (no. 5069).

6. *Besleria divaricata* Poepp. & Endl. Nov. Gen. 3 : 2. 1845.

I have studied the following collections:

ECUADOR: Boqueron (?), André K1483 (Y); without locality André 4617 (Y), K1498 (K).

These specimens agree fairly well with the description of *B. divaricata*, founded on a plant collected by Poeppig near Cuchero, Peru. The species appears to be more properly placed in *Eubesleria* than *Pseudobesleria*, as has been usual in the past.

7. *Besleria rupestris* Morton, sp. nov.

Subg. *Parabesleria*. Frutex 0.6–0.9 m. altus; caules teretes, superne lanati, inferne glabrescentes, ca. 5 mm. diametro; lamina foliorum oblique ovato-lanceolata vel lanceolata, maxima ca. 21 cm. longa et 7 cm. lata, crenata vel crenato-serrata, apice acuminata, basi cuneata vel paullulum rotundata, supra glabra, subtus imprimis in venis puberulenta, nervis secundariis 9–12; petiolus brevis, usque ad 1 cm. longus, pubescens; pedunculus communis gracilis, usque ad 6.5 cm. longus, sparse pilosus, pedicellos graciles corymbosos usque ad 6 mm. longos glabros gerens; lobi calycis liberi, ovato-lanceolati, 6–8 mm. longi, sparse pilosi, acuminati, spinuloso-denticulati; corolla viridi-alba, ecalcarata, anguste tubulosa, ca. 22 mm. longa, non ventricosa, sparse pilosa, lobis fortasse paullulum inaequalibus; filamenta corolla multo breviora; antherae connatae; ovarium pilosum; discus annularis, crassus.

Type in the U. S. National Herbarium, no. 1,196,535, collected between Baños and Cashurco, Valley of Pastaza River, Province of Tungurahua, Ecuador, altitude 1300–1800 meters, Sept. 25, 1923, by A. S. Hitchcock (no. 21820). The species is also found in Peru, as evidenced by the following collection: Eneñas, Pichis Trail, Dept. of Junín, alt. 1600–1900 meters, Killip & Smith 25759 (W).

A most distinct species by reason of its peculiarly long and narrow, sparsely pilose corollas, spinulose-denticulate, acuminate calyx lobes, and pilose ovary. The single corolla of our specimens is not well preserved and does not show the lobes very distinctly.

8. *Besleria corallinoides* Fritsch, in Repert. Nov. Sp. Fedde **18** : 11. 1922.

I have seen no material of this species. The following data are given for the type collection, from the Province of Pichincha, Ecuador: "In regione tropica secus fluvium Pilaton, 800 m. (Sodirol no. 119/55—Okt. 1882)."

9. *Besleria modica* Morton, sp. nov.

Subg. *Parabesleria*. Frutex erectus ca. 0.9 m. altus; caules angulati, dense strigosi; lamina foliorum elliptica, maxima 10 cm. longa et 4.5 cm. lata, apice acuta, basi anguste cuneata, integra, margine revoluta, ciliata, supra glabrata, subtus imprimis in venis strigillosa, nervis secundariis ca. 5; petiolus strigosus, usque ad 4 cm. longus; pedunculus communis nullus; pedicelli in axillis foliorum numerosi, ca. 1 cm. longi, dense strigillosi, angulati; lobi calycis basi connati, ovaes, ca. 4 mm. longi, rotundati, venosi, parce strigillosi, nervo mediano sursum incrassato; corolla rubella, erecta, ecalcarata, basi vix gibbosa, tubo inflato, 9–10 mm. longo, ca. 5 mm. lato, fauce contracto, pilis sparsis inconspicuis instructo, lobis erectis, ca. 2 mm. longis, aequalibus, obtusis; filamenta glabra; antherae parvae, liberae vel connatae; ovarium puberulum; stylus puberulus; discus annularis, glaber, integer; bacca parva, pubescens, stylo persistente coronata.

Type in the U. S. National Herbarium, no. 1,196,234, collected at gold mine near Zaruma, between La Chorita and Portovelo, Province of Oro, Ecuador, altitude 1000–2000 meters, Aug. 28, 1923, by A. S. Hitchcock (no. 21201).

The present species is known only from the type specimen. It appears to be related to *B. densiflora* Fritsch, of Peru, but that has a glabrous ovary and much larger leaves.

10. *Besleria Sodirolana* Fritsch, in Repert. Nov. Sp. Fedde **18** : 12. 1922.

I have seen no material of this species, which may not be distinct from *B. quitensis* (Benth.) Hanst. The type was collected by Sodirol (no. 119/53) in the subtropical region near San Florencio, Ecuador, at an altitude of 1600 meters.

PROCEEDINGS  
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AN INTRODUCED ANOBIID BEETLE DESTRUCTIVE  
TO HOUSES IN THE SOUTHERN STATES.

BY THOS. E. SNYDER,

Senior Entomologist,<sup>1</sup> Bureau of Entomology and Plant Quarantine,  
United States Department of Agriculture.

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A European anobiid Beetle, *Nicobium hirtum* Illiger, generally almost unknown in this country, although long established in the Gulf States, has recently been shown to be the cause of numerous reports of serious injury to woodwork in houses. This beetle, whose range now extends northward to South Carolina and Virginia, is most commonly found damaging old, well-seasoned furniture, although also attacking the yellow pine woodwork of buildings. It was listed by Leconte in 1865<sup>2</sup> as present in this country and a specimen is in the U. S. National Museum that was taken at Lake Ashby, Florida, by Hubbard and Schwarz in June, 1875 or 1876, as recorded by Schwarz in 1878.<sup>3</sup>

Its work is sometimes mistaken for that of dry-wood termites, as it burrows similarly in dry wood, from which fall pellets of the excreted wood (Fig. 1). These pellets are quite different from the bun-shaped pellets (Fig. 2) of the European "Death Watch Beetle" (*Xestobium rufovillosum* Deg.), which is a pest of woodwork in New England and in the Central Western States.

Adults of *Nicobium hirtum* (Fig. 4) were reared from June 2 to 20, 1932 at Washington, D. C., from a badly honeycombed piece of wood, a portion of a Duncan Phyfe piece of furniture from Charleston, S. C., dating back to 1800 or 1830. The adults are typical anobiid beetles, subcylindrical,

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<sup>1</sup> The photographs are by J. G. Pratt, the drawing of the adult (Fig. 3) by Harry Bradford, and the drawing of the larva (Fig. 6) by Dr. A. Böving.

<sup>2</sup> Leconte, J. L. Prodrum of a monograph of the species of the tribe Anobiini, of the family Ptinidae, inhabiting North America. Acad. Nat. Sci., Phila. Proc., 1865, pp. 222-244.

<sup>3</sup> Schwarz, E. A. Coleoptera of Florida. Amer. Philos. Soc. Proc. 17:353-469. 1878.



twice as long as wide, averaging about 4 mm. in length; the upper surface is of a mottled brown color, and is furnished with long, erect hairs. On the elytra are a series of distinctly impressed, longitudinal striae, marked with coarse, closely set punctures, and the pronotum is sparsely covered with small, shining black granules.

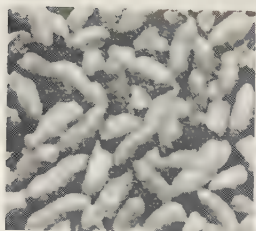
Nine eggs were dissected from one of the females to learn their appearance and thus facilitate the search for them, and afterwards some were found inside of the exit burrows. They had been deposited singly or in pairs on pellets of excrement or in the finer, fluffy frass not compressed into pellet form (Fig. 6). The eggs are about 0.625 mm. in length and about 0.42 mm. in diameter, with a pitted, reticulate, or honeycombed sculpturing as shown in the photograph. The eggs evidently require from 10 days to 2 weeks to hatch. Some infertile eggs were found in August.

The eggs were deposited in wood so disintegrated that it could be crumbled between the fingers (Fig. 3) and in consequence the active, legged larvae (Fig. 5) must do considerable free crawling or else plug up the old burrows which their own burrows intersect. The larvae have very long hairs and horizontal rows of yellow-brown spinules curving backward on the tergites. These spinules are thickest at the base. The spiracles are cribriform. On June 28, newly emerged larvae and some that were slightly larger were found, and on July 16 and August 2, additional freshly emerged larvae were observed. The pupal cell (Fig. 7) is constructed by the larvae of pellets of excrement cemented together, and these pellets on the interior surface of the cell are gnawed off to obtain a smooth surface.

Damage to the woodwork of houses was found in September, 1934, at New Orleans, La., and at Palatka, Fla., where the beetles in both cases were mining in yellow pine timbers.

#### PLATE III.—The Biology of *Nicobium hirtum* Ill.

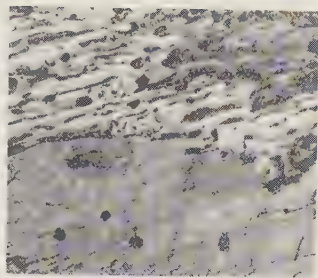
- Figure 1. — Pellets of excreted wood made by *Nicobium hirtum* Ill.  
(Enlarged 10 times.)
- Figure 2. — Bun-shaped pellets of excrement of the European Death Watch Beetle (*Xestobium rufovillosum* Deg.)  
(Enlarged 10 times.)
- Figure 3. — Wood honeycombed by *Nicobium hirtum* Ill., showing exit holes of adult beetles.  
(One-half natural size.)
- Figure 4. — Adult of *Nicobium hirtum* Ill.  
(Enlarged approximately 15 times.)
- Figure 5. — Larva of *Nicobium hirtum* Ill.  
(Enlarged approximately 15 times.)
- Figure 6. — The egg of *Nicobium hirtum* Ill. Note the soft frass nearby.  
(Enlarged 14 times.)
- Figure 7. — Pupal cells of *Nicobium hirtum* Ill. made of pellets of excreted wood cemented together.  
(Enlarged  $3\frac{1}{2}$  times.)



1



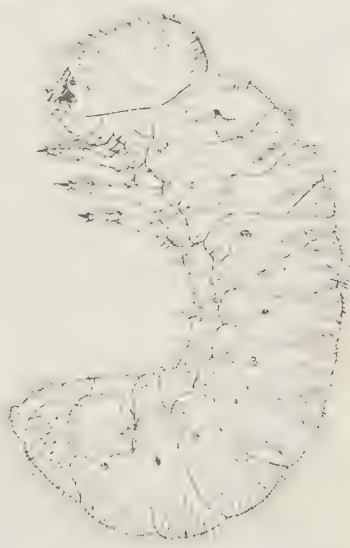
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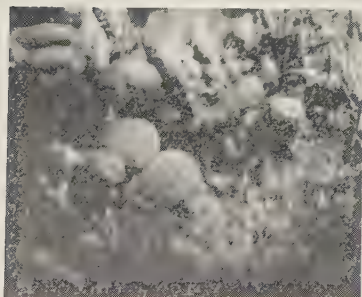
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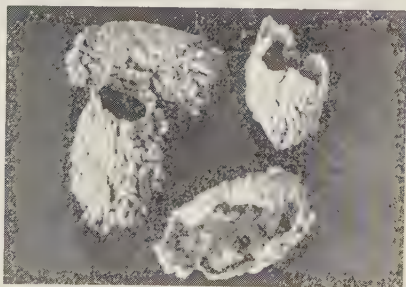
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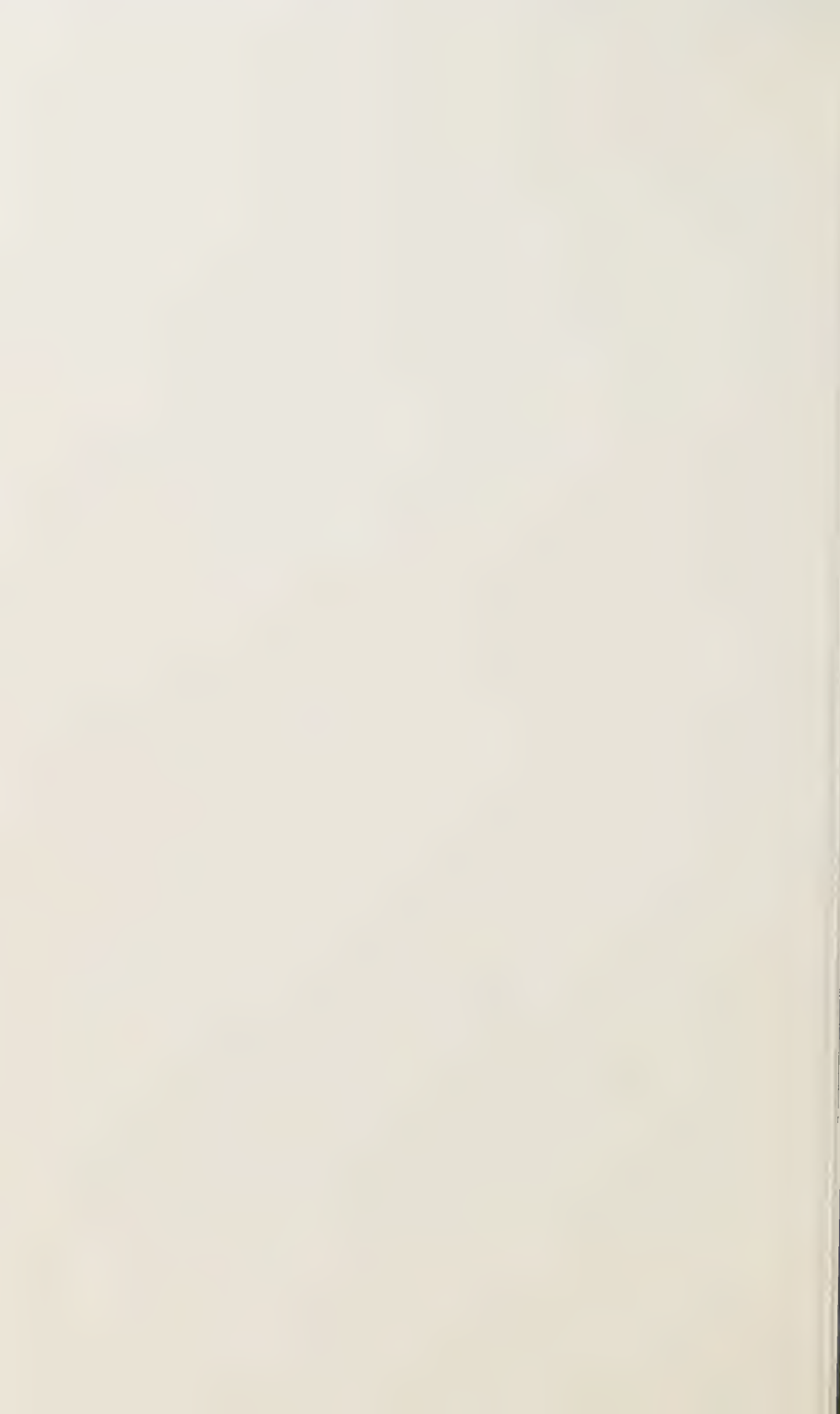
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PROCEEDINGS  
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TWO NEW BIRDS FROM THE SOUTHERN  
APPALACHIANS.

BY THOMAS D. BURLEIGH.

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In working over a collection of breeding birds from the southern Appalachians, taken by the writer during the past five years while engaged in field work in that region, two unrecognized races were found. These are distinct enough to warrant subspecific recognition and are described below:

*Nannus hiemalis pullus*, subsp. nov.

SOUTHERN WINTER WREN.

*Characters*.—Similar to *Nannus hiemalis hiemalis*, but decidedly darker and less rufescent above, the underparts lighter brown, with the vermiculation of the abdomen and flanks heavier; wing longer; bill smaller and more slender.

*Measurements*.—Type (adult male): Wing, 49 mm.; tail, 29.5; exposed culmen, 10.5. Average of four adult males from western North Carolina: Wing, 48.8 mm.; tail, 30; exposed culmen, 10.8. Average of four adult females from western North Carolina: Wing, 46.5 mm.; tail, 28.4; exposed culmen, 10.7.

*Type*.—Adult male, No. 301275, United States National Museum, Biological Survey collection; Mount Mitchell, North Carolina, altitude, 6,500 feet, July 11, 1931; Thomas D. Burleigh, original number, 1,571.

*Distribution*.—Breeds in the Canadian Zone of the southern Appalachians from western North Carolina (probably Virginia), to northern Georgia,<sup>1</sup> occurring in winter at a lower altitude in this same region.

*Remarks*.—This southern race of the winter wren can always be easily recognized in either sex by its distinctly darker upper-parts, a characteristic common to other birds limited in their distribution to this general region. Even in worn breeding plumage this character is at once evident.

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<sup>1</sup> Auk, vol. 42, 1925, p. 73.

Table of comparative measurements of the two eastern races of *Nannus hiemalis*:

|                     | <i>hiemalis</i> <sup>2</sup> | <i>pullus</i> <sup>3</sup> |
|---------------------|------------------------------|----------------------------|
| Wing.....           | 47.5 mm.                     | 48.8 mm.                   |
| Tail.....           | 30.0                         | 30.0                       |
| Exposed culmen..... | 11.4                         | 10.8                       |

Specimens of *Nannus hiemalis pullus* examined: Total number, 8, from the following localities: North Carolina: Mount Mitchell, 5; Great Smoky Mountains, 2; Rocky Knob, 1.

***Certhia familiaris nigrescens*, subsp. nov.**

SOUTHERN CREEPER.

*Characters*.—Similar to *Certhia familiaris americana*, but crown and upper half of back distinctly darker, the prevailing color being fuscous black rather than sepia; primaries darker and approaching clove brown; tail more grayish (hair brown); russet of rump darker; underparts grayer.

*Measurements*.—Type (adult male): Wing, 68.8 mm.; tail, 64; exposed culmen, 13.7. Average of four adult males from western North Carolina: Wing, 66.7 mm.; tail, 62; exposed culmen, 13.6. Average of three adult females from western North Carolina: Wing, 62; tail, 57.1; exposed culmen, 13.6.

*Type*.—Adult male, No. 301577, United States National Museum, Biological Survey collection; Mount Mitchell, North Carolina, altitude, 6,600 feet, May 8, 1930; Thomas D. Burleigh, original number, 886.

*Distribution*.—Breeds in the Canadian Zone of the southern Appalachians from Pocahontas County, West Virginia (Cranberry Glades), to the Great Smoky Mountains in western North Carolina and eastern Tennessee; winters at a lower altitude in this same region.

*Remarks*.—This southern race of the brown creeper is easily distinguished in fresh winter plumage by the lack of brown on the crown and upper half of the back. In worn breeding plumage this character is somewhat obscure, but the color of the tail, hair brown rather than pale brown as in *Certhia familiaris americana*, is readily diagnostic, as are the darker primaries. Breeding birds taken in June and July are so badly worn that accurate measurements could not be taken, but apparently there is no appreciable difference in size in the two eastern races.

Specimens of *Certhia familiaris nigrescens* examined: Total number, 13, from the following localities: North Carolina: Mount Mitchell, 3; Great Smoky Mountains, 4; Asheville (Bent Creek), 5. West Virginia: Pocahontas County (Cranberry Glades), 1.

Grateful acknowledgment is made to James L. Peters, Curator of Birds, Museum of Comparative Zoölogy, Cambridge, Massachusetts, and to Dr. Herbert Friedmann, Curator of Birds, United States National Museum, Washington, D. C., for the loan of specimens used in comparison.

<sup>2</sup> 6 breeding males from Maine and New Hampshire.

<sup>3</sup> 4 breeding males from western North Carolina.

PROCEEDINGS  
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GEOGRAPHICAL VARIATION IN THE AMERICAN  
TITLARK.

BY W. E. CLYDE TODD.

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At the meeting of the American Ornithologists' Union in New York in 1925 I presented a brief informal paper under the above title, calling attention to two heretofore unrecognized races of the American Titlark or Pipit, then known (and I still think properly so) as *Anthus rubescens*. With additional pertinent material now available, the time has come for a formal description of these new forms. I am greatly indebted to Dr. Joseph Grinnell of the University of California Museum of Vertebrate Zoölogy, and to Mr. Jesse D. Figgins of the Colorado Museum of Natural History, for the loan of specimens for comparison.

The western race of this species I propose to call

***Anthus rubescens pacificus***, subsp. nov.

WESTERN PIPIT.

*Type*, No. 115,833, Collection Carnegie Museum, adult male; Red Pass (6000 feet), British Columbia, June 20, 1934; George M. Sutton.

*Subspecific characters*.—Similar to *Anthus rubescens rubescens* (Tunstall) of eastern North America, but lighter-colored throughout, the upper parts paler, and the under parts also paler, buffy rather than vinaceous.

*Range*.—Western North America, breeding from Alaska southward along the Rocky Mountains to Oregon; in winter to California and Mexico.

*Remarks*.—Western birds of this species are readily separable from eastern specimens by their uniformly lighter coloration. In fall plumage the difference in color is that between Saccardo's umber and sepia of Ridgway's "Color Standards," and is well marked when series of the two lie side by side. It holds also when spring and summer birds are used for comparison. While certain odd specimens of the western bird may be matched approximately by individuals of the typical eastern race, the differences between the two in series stand out very well—as well, indeed,

as do those distinguishing the western races of either *Spizella arborea* or *S. pusilla*. These differences are best shown by birds in fresh unworn breeding dress (May), which are decidedly buffy below, while specimens of *rubescens* in corresponding plumage show a more or less vinaceous tinge on these parts. The upper parts in general are more sandy brownish, less decidedly grayish, than they are in *rubescens*, while the wings and tail, which in the latter are dusky black, are dusky brown instead. In worn breeding dress (July) there is not nearly so much difference in the color of the upper parts, but the wings and tail remain browner in the western race, and the under parts are whiter, since the buffy tinge seems to fade out more than the vinaceous of the eastern birds. In fresh winter and immature specimens (late August and September) we find the differences between the two races still well marked. Brewster<sup>1</sup> remarked the different color of his specimens from the Cape region of Lower California, but considered that the differences were neither "pronounced nor constant." But with an unusually good series of eastern birds available for comparison I consider that the characters I have pointed out are decidedly of sub-specific value. All the synonyms of the species appear to belong to the eastern race, leaving the western one to be named.

The above remarks are based on the examination of a series of twenty-seven spring and summer specimens from British Columbia and Alaska, as compared with a large series of eastern birds. Twenty-five fall and winter specimens of the new form have also been seen.

The second form may be known as

***Anthus rubescens alticola*, subsp. nov.**

ROCKY MOUNTAIN PIPIT.

*Type*, No. 16,748, Collection Carnegie Museum, adult female; Estes Park, Colorado, July 20, 1893; Richard C. McGregor.

*Subspecific characters*.—Similar to *Anthus rubescens pacificus* nobis of the northern Pacific coast region, but with the under parts in the breeding season more richly and more uniformly buffy, with little or no dusky streaking. (This is *not* a matter of wear!)

*Range*.—Breeding at suitable altitudes in the Rocky Mountains of Colorado and probably of other States, but the exact limits of its range otherwise unknown.

*Remarks*.—The distinctive characters of our two specimens from Estes Park are fully confirmed by the larger series (eight specimens) examined from several other localities in Colorado (Barr; Geneva Park, Park County; Mount Bross, near Alma; Alice; Moffat County), and which are preserved in the Colorado Museum of Natural History. Indeed, the new form appears upon comparison in series to be more distinct from *pacificus* than the latter is from *rubescens* itself. That it has not been detected heretofore must be because too much importance has been attached to individual variants which occasionally approach it in their characters, although coming from within the range of the other forms. The Colorado breeding bird, as

<sup>1</sup> Bulletin Museum Comparative Zoölogy, XLI, 1902, 193.

indicated by the material examined, is peculiar in the more uniform appearance of the under parts, the streaking being reduced to a minimum, while the buffy color is at the same time more pronounced. This is a constant feature in the series examined. Although the amount of streaking varies in both *rubescens* and *pacificus*, as already remarked, breeding birds of these forms, taken as a series, are quite distinct from breeding birds of the present race in respect to this character, as well as in respect to the color itself, which is between the pinkish buff and cinnamon buff of Ridgway. There is thus abundant ground for the recognition of a Rocky Mountain breeding race, and the circumstance that occasional individuals from other parts may show its characters to a greater or less extent is just what might be expected. In size the new race averages a little larger than either *rubescens* or *pacificus*. The discrimination of non-breeding examples has not been attempted; it may prove to be difficult.





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REMARKS ON THE AVIAN GENUS EOS.

BY JAMES L. PETERS.

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The genus Eos was first proposed by Wagler in his "Consp. Psittacorum," published in Abhandl. k. bayer. Akad. Wiss., 1, 1832, p. 465-750. Seven species were assigned to the genus by its describer, but no type was fixed. G. R. Gray in 1840 (List Gen. Bds., p. 52) designated the first species "*E. indica*" (= *Psittacus indicus* Gmelin 1788 = *Psittacus histrio* P. L. S. Müller 1776) as type. The other species included by Wagler were, 2 *Psittacus ruber* Gmelin, 3 *Psittacus guebiensis* Gmelin, 4 *Psittacus cochinchinensis* Latham, 5 *Psittacus variegatus* Gmelin, 6 *Psittacus cervicalis* Latham, 7 *Psittacus ornatus* Linné. Of these no. 6 has never been satisfactorily identified and no. 7 was a few years later correctly identified as a *Trichoglossus* in which genus it remains; nos. 3, 4 and 5 have been much shunted about within the genus, sometimes in use for one species, then another, and at one time all three were quoted as synonyms of the later *Psittacus riciniatus* Bechstein; no. 2 was replaced by the earlier *Psittacus borneus* Linné and, as already indicated, *indicus* supplanted by *histrio*.

Bonaparte in Consp. Av. 1, 1850, p. 4, named two new species which he referred to Eos, *E. cyanogenia* and *E. semilarvata*; the same author a few years later transferred *Lorius cardinalis* G. R. Gray to Eos. *Eos cyanotriata* G. R. Gray 1845 was found by Sclater in 1860 to be identical with *Psittacus reticulatus* S. Müller, 1841. Bonaparte's *Chalcopsitta rubiginosa* 1850 was referred to Eos by G. R. Gray in 1859. Blyth described *Eos fuscata* in 1858.

Finsch in his "Papageien" 1867-1868 placed practically all of the Lories in the genus Domicella Wagler, thereby lumping Eos with some other genera not very closely related. Salvadori in Orn. Pap. delle Mol., 1, 1880, p. 245-268, accorded Eos full generic standing, the same treatment he later used in Vol. 20, 1891, of the Cat. Bds. Brit. Mus., an arrangement copied by Mivart in Monog. Loriidae, 1896, and closely adhered to by Sharpe in Hand-list of Birds., 2, 1900, p. 2, and still followed by Salvadori

again when he briefly reviewed the genus in Wystman's *Genera Avium*, pt. 11, 1910.

Reichenow, *Journ. f. Orn.*, **61**, 1913, p. 401, created a monotypic genus *Oenopsittacus* for *rubiginosa*. His action in removing that species from *Eos* was quite justified, but he should have transferred it to *Trichoglossus* instead of to a monotypic genus. As Rensch has pointed out (*Mitt. Zoöl. Mus. Berlin*, **17**, 1931, p. 528), this bird is a member of the *ornatus-haematod* group in which the zoofulvin of the body plumage has been replaced with zoonerythrin. My studies of *Eos* have convinced me that there are still two more discordant elements in the genus, *cardinalis* and *fuscata*. *Cardinalis*, inhabiting the Solomon Islands and Feni and Nissan Islands east of New Ireland, differs in possessing wider, more rounded rectrices, a more graduated tail and a large apterium at the base of the lower mandible, in these respects agreeing with the genus *Chalcopsitta* of New Guinea. While in some respects linking *Eos* and *Chalcopsitta* it certainly does not do so zoogeographically, and for this reason I do not lump the two, but consider *cardinalis* to be the Solomon Islands representative of the New Guinea *Chalcopsitta*.

Apparently no very serious attempt at the proper allocation of *E. fuscata* has ever been made. Some of the writers of sixty years ago placed it in *Chalcopsitta*, but for the most part it has remained in the genus in which it was originally described, its aberrant characters being recognized by placing it as the last species of the sequence. In spite of my aversion to creating monotypic genera based on long and well known species, I can not see the way clear to retaining *fuscata* in *Eos* any longer, nor do its characters permit its inclusion in any other genus. I therefore propose

#### PSEUDEOS, gen. nov.

Related to *Eos* Wagler, but tail little more than half as long as wing, the folded wing reaching nearly to its tip; base of lower mandible extensively naked; build relatively stouter; coloration very different. Type, *Eos fuscata* Blyth.

Reallocation of *rubiginosa*, *cardinalis* and *fuscata* is not only the proper procedure on basis of external structure, but is also perfectly logical on zoogeographic grounds. *Eos*, as I now constitute it, is a homogeneous group of 7 species divided into 15 forms extending from the Sangi and Talaut Islands through the entire Molucca group to the Tenimber Islands, one species being represented on the western Papuan Islands, and an endemic species occurring on some of the islands in Geelvink Bay.

*Eos cyanogenia* Bonap.

*Range*.—Islands in Geelvink Bay: Biak, Numfor, Manim and Mios Nom.

*Eos reticulata* (S. Müll.)

*Range*.—Tenimber Islands. Introduced into the Kei Islands and on Damar.

*Eos squamata squamata* (Bodd.)

*Range*.—Western Papuan Islands: Gebe, Waigeu, Batanta and a small island near Misol.

*Remarks*.—This is the bird for many years known as *Eos wallacei* Finsch. There can be no doubt now that Boddaert's name based on Daubenton's Pl. enlum. no. 684 is referable to an immature bird of this form, though Guéby (=Gebe) may not have been the actual source of the specimen figured.

*Eos squamata guenbyensis* (Scopoli)

*Range*.—Northern Moluccas: Morty, Halmahera, Ternate, Tidore, Batjan, etc.

*Remarks*.—Scopoli based his name on Sonnerat's "petit Lori de Guéby" (Voyage à la Nouvelle Guinée, p. 174, pl. 109). The plate is perfectly identifiable as the adult of the race of *squamata* found on the Moluccas, and I quite agree with Oberholser in his fixation of the type locality as Halmahera (Proc. Biol. Soc. Wash., 31, 1918, p. 48). There is no particular reason to suppose that the bird Sonnerat described and figured came from Gebe—he described several other species at the same time that came either from the western Papuan Islands or the mainland of New Guinea—but on the other hand there is no evidence that his journey extended beyond an island in the Moluccas that he constantly refers to as "Pulo xxx." The French vessels, however, were continually visited by natives bringing specimens of birds and plants, and it was from these sources, rather than exertions of his own, that Sonnerat secured the originals of his drawings and descriptions.

Acceptance of Scopoli's name precludes the use of the following which at one time or another have been applied to this bird:

*Psittacus guebiensis* Gmelin, 1788, a composite in which both Daubenton's and Sonnerat's species appeared.

*Psittacus variegatus* Gmelin 1788, based exclusively on Latham who describes a bird that I can not identify as an *Eos*.

*Psittacus cochinchinensis* Latham 1790.

*Psittacus riciniatus* Bechstein 1811.

*Psittacus cucullatus* Shaw 1811.

*Lorius isidorii* Swainson 1829.

*Eos squamata obiensis* Rothschild 1899.

*Range*.—Island of Obi, Moluccas.

*Eos squamata insularis* Guillemard 1885.

*Range*.—Weda Island in the Sea of Halmahera.

*Eos histrio histrio* (P. L. S. Müller) 1776.

*Range*.—Sangi Islands.

*Eos histrio talautensis* Meyer & Wigglesworth 1894.

*Range*.—Talaut Islands.

*Eos histrio challengerii* Salvadori 1891.

*Range*.—Nenusa Islands.

*Eos bornea cyanonothus* (Vieillot) 1818.

*Range*.—Buru.

*Eos bornea bornea* (Linné) 1758.

*Range*.—Amboina.

*Eos bornea rothschildi* Stresemann 1912.

Range.—Ceram.

*Eos bornea bernsteini* (Rosenberg) 1863.

Range.—Kei Islands.

*Eos semilarvata* Bonaparte 1850.

Range.—Mountains of Ceram above 5000 feet.

? *Eos goodfellowi* Ogilvie Grant 1907.

Range.—Island of Obi.

*Remarks.*—This species was described from two specimens then living in the aviary of Mr. Brook (since deceased) of Hodham, England. The very short and unsatisfactory diagnosis indicates that the bird may possibly be related to *E. semilarvata*; on the other hand, Siebers inclines to the belief that *goodfellowi* is only the immature of *E. squamata obiensis*. Mr. N. B. Kinnear informs me that the types are not in the British Museum, all trace having been lost after the birds passed from the possession of the original owner to other hands.

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A NEW HAWK OF THE GENUS GERANOSPIZA.

BY JAMES L. PETERS.

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In the first volume of my Check-List I regarded *Geranospiza*, a genus of Neotropical Accipitridae, as composed of three species,—*nigra*, *caerulescens* and *gracilis*. At the time I worked on these birds I had seen insufficient material, particularly from eastern and southern Brazil, but in the light of additional specimens since received I now agree with both Chapman and Hellmayr that *Geranospiza* should be regarded as monotypic and all the forms treated as subspecies.

A specimen from the Argentine Chaco that has lain in the Museum of Comparative Zoölogy for several years under the name of *gracilis* has not been recognized as belonging to an undescribed race in default of comparative material of topotypical *gracilis* (*Falco gracilis* Temminck, Pl. col., livr. 16, 1821, pl. 91, eastern parts of Brazil). Suspicion was first aroused by the receipt of a male of *gracilis* taken in southeastern Bahia by Dr. O. Pinto of the Museum Paulista which agreed with Temminck's plate in the absence of barred wing coverts, whereas in the Argentine specimen the wing coverts are regularly and conspicuously barred; this is also shown by the bird from Salta, Argentina, figured in Swann's "Monograph" (Monogr. Bds. Prey, pt. 3, pl. lower fig.) and two specimens from Kilometer 80, west of Puerto Pinasco, Paraguay, collected by Dr. Wetmore and kindly loaned to me by Dr. Friedmann. It was with some astonishment I found that Laubmann (Wiss. Ergebn. Deutsch. Gran Chaco-Exped., Vögel, 1930, p. 99) was unable to distinguish his two Argentine and Bolivian specimens from an east Brazilian bird in the Munich Museum.

In an effort to bring the matter to a conclusion I appealed to Dr. Hellmayr, who most generously furnished me with information about all the specimens of *gracilis* that he had examined, 14 in all, of which he had ten at hand when he wrote me. Hellmayr's notes show conclusively that there is no geographic correlation between barred wing coverts and uniform wing coverts; some specimens from eastern Brazil having them barred while in others from the southern part of the range they were plain. The wing measurements that he furnished, however, indicate a constant size differ-

ence, sex for sex, between northern and southern birds and I therefore distinguish

***Geranospiza caerulescens flexipes*, subsp. nov.**

*Type*.—No. 99141, Museum of Comparative Zoölogy, adult ♀, Resistencia, Chaco, Argentina. Collected 18 July, 1915, by J. Mogensen.

*Characters*.—similar to *G. c. gracilis* (Temminck) of eastern Brazil but larger. The white barring on the underparts instantly distinguishes both *gracilis* and *flexipes* from the other forms of the genus.

WING MEASUREMENTS<sup>1</sup>

*Geranospiza caerulescens gracilis*.

| ♂                         |              | ♀                       |              |
|---------------------------|--------------|-------------------------|--------------|
| *Paragua, Piahy .....     | 270 <i>b</i> | *Rio Preto, Bahia ..... | 300 <i>b</i> |
| *Ceara .....              | 280          | *Rio Preto, Bahia ..... | 300 <i>b</i> |
| Rio Jucuruçu, Bahia ..... | 271          | *Lamarao, Bahia .....   | 314          |

*Geranospiza caerulescens flexipes*.

|                              |              |                           |                  |
|------------------------------|--------------|---------------------------|------------------|
| *Araguay, Goyaz.....         | 308 <i>b</i> | *Araguay, Goyaz.....      | 320              |
| *Pansecco, Matto Grosso..... | 300          | *Cuyabá, Matto Grosso.... | 340 <i>b</i>     |
| *Sabauna, Sao Paulo.....     | 308          | *Descalvados Mat. Grosso  | 326              |
| (originally sexed as ♀)      |              | *Santa Cruz, Bolivia..... | 337              |
| Puerto Pinasco, Paraguay..   | 312 <i>b</i> | Resistencia, Chaco.....   | 360 <i>b</i>     |
| Puerto Pinasco, Paraguay..   | 300 <i>b</i> | *Corrientes.....          | 325 <sup>2</sup> |

The description and measurements given by Swann in his monograph appear to be based entirely on the southern race. In addition to the plate already mentioned, he gives the wing of males as measuring from 314–325 and that of females 340–375.

<sup>1</sup> The specimens marked with an asterisk \* are those measured by Dr. Hellmayr; those followed by a letter *b* have strongly barred wing coverts.

<sup>2</sup> Originally sexed as ♂ perhaps correctly so in view of the large size of the Chaco specimen.



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THE GENUS *BESLERIA* IN VENEZUELA.<sup>1</sup>

BY C. V. MORTON.

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Three new species of *Besleria* (Gesneriaceae) have been detected among the large Venezuelan collections of Mr. H. Pittier. In order to relate them satisfactorily to those previously known the following key has been prepared. I have had the privilege of examining Venezuelan material of this genus from the following herbaria: Botanical Museum of Copenhagen, Gray Herbarium of Harvard University, Royal Botanic Gardens, Kew, Academy of Natural Sciences, Philadelphia, New York Botanical Garden, and the U. S. National Herbarium.<sup>2</sup>

KEY TO SPECIES.

Corolla spurred at base. Corolla yellow.

Calyx segments glabrous except at base; corolla about 20 mm. long;  
calyx 4 mm. long or less.....1. *B. pendula*

Calyx segments strigillose throughout; corolla about 30 mm. long;  
calyx 6-7 mm. long.....2. *B. penduliflora*

Corolla not spurred at base.

Flowers aggregate in the leaf axils.

Stems and leaves hirsute; calyx lobes more than half as long as  
the corolla, linear-lanceolate, about 14 mm. long; corolla  
white.....3. *B. disgrega*

Stems and leaves appressed-pubescent or glabrate; calyx lobes  
less than half as long as the corolla, ovate, rounded or obtuse,  
4 mm. long or less; corolla red.....4. *B. acutifolia*

Flowers borne on a common peduncle, disposed in corymbs or umbels.

Calyx lobes strigillose throughout, acute, scarcely mucronate;  
corolla yellow, membranous, 8-9 mm. long. Secondary  
nerves of the leaves 6 or 7.....5. *B. clivorum*

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<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.

<sup>2</sup> In the following treatment these institutions are represented by the following abbreviations: Co, G, K, P, Y, and W, respectively.

Calyx lobes glabrate, rounded at apex; corolla yellow, red, brown, or orange, membranous or fleshy, 12–22 mm. long.

Calyx lobes rounded, not mucronate; corolla orange or brown, fleshy, the lobes reflexed, glandular within.....

6. *B. Rhytidophyllum*

Calyx lobes mucronate; corolla yellow, red, or orange, membranous, the lobes neither reflexed nor glandular within.

Leaf blades ovate or oblong, rounded at base; secondary veins 11 or more.....7. *B. affinis*

Leaf blades lanceolate, oblanceolate, or narrowly elliptic, attenuate at base; secondary veins 6 or 7.....8. *B. mucronata*

### 1. *Besleria pendula* Hanst. *Linnaea* 34 : 333. 1865.

I have examined a specimen of the type collection in the Gray Herbarium (*Moritz* 1135, collected at Mérida, Venezuela). The species is also known from Colombia.

*Additional Venezuelan specimens examined:*

TRUJILLO: Lagunetas, between Trujillo and San Lazaro, alt. 1500 meters, *Jahn* 101 (W).

### 2. *Besleria penduliflora* Fritsch, *Repert. Sp. Nov. Fedde* 18 : 9. 1922.

This species was collected on Roraima, alt. 1600 meters, by Ule (no. 8751). I have seen no specimens. According to Fritsch it is near *B. pendula* Hanst.

### 3. *Besleria disgrega* Morton, sp. nov.

Subg. *Pseudobesleria*. Frutex 0.5–1.5 m. altus, vix ramosus; caules teretes, dense hirsuti; lamina foliorum ovata vel elliptica, maxima ca. 19 cm. longa et 8.5 cm. lata, apice breviter acuminata, basi cuneata, denticulata, ciliata, supra hirsuta, subtus imprimis in venis hirsuta, nervis secundariis 7–9; petiolus crassus, usque ad 6 cm. longus, hirsutus; pedunculus communis nullus; pedicelli in axillis foliorum dense aggregati, ca. 7 mm. longi, hirsuti; lobi calycis flavi, liberi, integri, lineari-lanceolati, ca. 14 mm. longi, carinati, acuminati, utrinque hirsuti; corolla alba, tubulosa, erecta, ecalcarata, 15–18 mm. longa, vix ventricosa, extus puberulenta vel glabrescens, intus glabra, fauce parce glandulosa, lobis erectis, rotundatis, ciliolatis; filamenta glabra; antherae connatae; ovarium conicum, glabrum; stylus glaber; stigma bilobum; discus annularis, integer, glaber; fructus deest.

Type in the U. S. National Herbarium, no. 1,232,700, collected at El Portachuelo, on the road between Maracay and Ocumaré, Aragua, Venezuela, at 1100 meters altitude, May 8, 1925, by H. Pittier (no. 11810). Duplicate at the New York Botanical Garden.

*Additional Venezuelan specimens examined:*

FEDERAL DISTRICT: Hacienda Puerto La Cruz, *Jahn* 1324 (W); *Pittier* 8085 (W).

ARAGUA: Alto de Rancho Grande, *Pittier* 12151 (W, Y); El Portachuelo, *Pittier* 11367 (W); near Colonia Tovar, *Fendler* 2030 (K).

*Besleria disgrega* does not belong to the same section as any other of the Venezuelan species of *Besleria*. Possibly it is to be compared with *B.*

*columnneoides* Hanst., of Costa Rica, but that species must be very different by reason of its toothed calyx lobes and hairy corolla and ovaries.

4. *Besleria acutifolia* Benth. Plant. Hartw. 237. 1846.

This Colombian species was reported from Venezuela by Hanstein on the basis of *Moritz* 1491, from Mérida, but I have seen no specimens.

5. *Besleria clivorum* Morton, sp. nov.

Subg. *Parabesleria*. Frutex 1 m. altus; caules teretes, graciles, dense sericeo-strigilloso; lamina foliorum elliptica, maxima ca. 10.5 cm. longa et 4 cm. lata, integra, apice breviter acuminata, basi cuneata, supra parce strigillosa, mox glabrescens, subtus strigillosa, pallidior, nervis secundariis 6 vel 7; petiolus usque ad 3 cm. longus, dense sericeo-strigillosus; inflorescentia corymbosa, pedunculis communibus gracilibus, usque ad 4 cm. longis, strigillosis, pedicellis usque ad 2 cm. longis, apice paullulum incrassatis; lobi calycis basi parum connati, ovati, ca. 4.5 mm. longi, imbricati, strigilloso, apice vix mucronati, margine ciliolati; corolla lutea, ecalcarata, tubo cylindrico, non ventricoso, 8–9 mm. longo, 3.5 mm. lato, extus glabro, intus glanduloso (annulo piloso nullo), lobis ca. 3 mm. longis, rotundatis, patentibus, eciliatis, extus glabris, intus fauce glandulosus; filamenta libera, glabra; staminodium bene evolutum; antherae connatae, loculis confluentibus; ovarium glabrum; stylus glaber; stigma bilobum; discus annularis, grosse lobatus, glaber; bacca tuberculata, ca. 8.5 mm. diametro.

Type in the U. S. National Herbarium, no. 1,281,986, collected in the forests of Valle en El Medio, Chuao, Aragua, Venezuela, at 600 meters altitude, March 15, 1926, by H. Pittier (no. 12128). Duplicate at the New York Botanical Garden.

*Additional Venezuelan specimens examined:*

Between Carrizal and San Diego, 1400 meters alt., *Pittier* 12982 (W, Y). Near Colonia Tovar, Aragua, *Fendler* 2029 (K).

This species may be related to *B. Rhytidophyllum* Hanst., which similarly has the corolla tube glandular within. The leaves of the latter, however, tend to be larger and oblanceolate, rather than elliptic, the calyx lobes are larger, glabrate, and more rounded, and the corolla is broader, fleshier, and orange or brownish in color, rather than yellow as in *B. clivorum*.

6. *Besleria Rhytidophyllum* Hanst. Linnaea 34: 332. 1865.

The type of this species was collected near Colonia Tovar by *Moritz* (no. 869). I have seen the following collections:

ARAGUA: Colonia Tovar, alt. 1800–1950 meters, *Fendler* 788 (G, P, Y).

Inasmuch as the calyx lobes are united almost to the middle, this species should probably be referred to the subgenus *Eubesleria*.

7. *Besleria affinis* Morton, sp. nov.

Subg. *Parabesleria*. Herba vel suffrutex, 1.2–1.5 m. altus; caules quadrangulares, superne strigilloso, inferne glabrescentes; lamina foliorum ovata vel oblonga, maxima ca. 20 cm. longa et 9 cm. lata, inconspicue denticulata, apice breviter acuminata, basi rotundata, supra glabrata, subtus strigillosa, nervis secundariis 11–15; petiolus usque ad 9.5 cm. longus, strigillosus; pedunculus communis elongatus, usque ad 16 cm. longus, glabratus, pedicellos corymbosos graciles usque 2 cm. longos gerens; calyx ca. 4.5 mm. longus, lobis fere ad medium connatis, ovatis, glabris,

ciliolatis, nervo mediano incrassato in mucronem excurrente; corolla rubra vel lutea, 13–16 mm. longa, ecalcarata, basi non saccata, glabra, membranacea, tubo vix ventricosus, lobis ovalibus, inaequalibus, rotundatis, fauce parce pubescentibus; filamenta glabra, tubum corollae aequantia; antherae connatae; ovarium conicum, glabrum; stylus glaber; discus annularis, integer, glaber; bacca minute tuberculata, ca. 7 mm. diametro.

Type in the U. S. National Herbarium, no. 1,344,026, collected in humid forest, Ocumaré Valley, Aragua, Venezuela, Oct. 13, 1927, by H. Pittier (no. 12562).

*Additional Venezuelan specimens examined:*

Type locality, *Pittier* 12563 (W, Y); Colonia Tovar, *Fendler* 2365 (G); without locality, *Linden* 1403 (K).

The present species is obviously related to *B. mucronata* Hanst., which differs in its oblanceolate, lanceolate, or narrowly elliptic leaves, with attenuate bases and fewer (6 or 7) secondary nerves.

**8. *Besleria mucronata* Hanst. *Linnaea* 34: 330. 1865.**

The type (not seen) was collected at Caracas, Venezuela, by Gollmer.

*Venezuelan specimens examined:*

FEDERAL DISTRICT: Upper Catuche wood near Caracas, *Pittier* 7158 (W); 9584 (Y); Petaquire, *Fendler* 787 (G, K, Y); Caracas, *Berschel* (K); Hacienda Puerto La Cruz, *Pittier* 8071 (W).

ARAGUA: Near Colonia Tovar, *Fendler* 2606 (K). Without locality, *Eggers* 13221 (Co).

DUBIOUS SPECIES.

**BESLERIA LABIOSA Hanst. *Linnaea* 34: 324. 1865.**

I have seen no material which could be referred to this species. Hanstein creates for it the section *Rhynchobesleria*.

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NEW BIRDS FROM KENYA COLONY.

BY JAMES L. PETERS AND ARTHUR LOVERIDGE.

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The two new races described below were collected by the junior author on his most recent visit to Uganda and Kenya Colony on behalf of the Museum of Comparative Zoölogy with the support of a fellowship granted by the John Simon Guggenheim Foundation of New York.

***Tyto capensis libratus*, subsp. nov.**

*Type*.—Adult ♀, no. 168653, Museum of Comparative Zoölogy, from Kaimosi, Kakamega district, Nyansa Province, Kenya Colony. Collected 21 February, 1934, by Arthur Loveridge.

*Characters*.—Similar to *Tyto capensis capensis* (A. Smith)<sup>1</sup> but the upper parts much blacker brown and lacking the whitish dorsal spots. Below paler, the buff restricted to a band across the breast; flanks, abdomen and tibiae white; dark spots smaller and more reduced in number. Similar also to *Tyto capensis damarensis* Roberts<sup>2</sup> in having paler underparts and smaller spots below, but darker above and indications of white spots practically absent.

*Measurements*.—Wing, 295 mm.; tail, 120 mm.; tarsus, 78 mm.; culmen, 20 mm.

*Remarks*.—So far as we can discover this is an extremely rare bird in East Africa. Apparently this specimen constitutes the second record for Kenya Colony, the first being a male recorded from Fort Hall by van Someren.<sup>3</sup> While referring this bird to the South African race he notes that it has the characters displayed by our Kaimosi bird and surmises that it may prove to be a new form.

***Zosterops silvanus*, sp. nov.**

*Type*.—Adult ♂, no. 168994, Museum of Comparative Zoölogy, from Mt. Mbololo, 4,800 feet, Taita, Kenya Colony. Collected 21 April, 1934, by Arthur Loveridge.

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<sup>1</sup> *Strix capensis* A. Smith, S. Afr. Quart. Journ. (2), 1834, p. 317. South Africa.

<sup>2</sup> Ann. Transv. Mus., 8, 1922, p. 212. Damaraland.

<sup>3</sup> Nov. Zool., 29, 1922, p. 46.

*Characters*.—Most nearly related to *Zosterops winifredae* Slater and Moreau,<sup>4</sup> but instantly distinguished by its very large and conspicuous white eye ring; more olive less yellowish green upper parts; forehead not golden yellow; throat greenish yellow and not pale yellow; median portion of posterior underparts clear gray like the flanks (not white) and bill much longer and stouter.

*Measurements*.—

|              | <i>W.</i> | <i>T.</i> | <i>Bill</i> |
|--------------|-----------|-----------|-------------|
| ♂ type ..... | 58        | 47.5      | 11          |
| ♂ .....      | 56        | 47        | 11.5        |
| ♀ .....      | 54        | ---       | 11.5        |
| ♀ .....      | 54        | 46.5      | 11.3        |

There are a number of species of *Zosterops* in Africa with yellow throats and undertail coverts separated by gray, brown or whitish underparts, and until the relationships of these groups are worked out, treatment as species is advisable.

We are indebted to Dr. W. L. Slater for comparing one of our specimens with the series of *Zosterops winifredae* in the British Museum.

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<sup>4</sup> Bull. Brit. Orn. Cl., 55, 1934, p. 14. Chome, in forest on South Pare Mountains, 6200 feet, Usambara district, Tanganyika Territory.



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THE NAME OF THE GOPHER FROG.

BY FRANCIS HARPER.

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*Rana areolata* Baird and Girard (1852, p. 173) was described from Indianola, Matagorda County, Texas. The type specimen (U. S. Nat. Mus., No. 3304) is a medium-sized adult. (Originally recorded as "three inches and a half," the length at present is only 77 mm.; the tibia is 38.) Its color has faded to such an extent that the dorsal body pattern is no longer very distinct. The pattern of the hind limbs, however, corresponds to that of well-preserved specimens from Rogers County, Okla. (U. S. N. M., No. 94247), and from Montgomery County, Mo. (U. S. N. M., Nos. 57844-57848), in having the broad light bars interrupted in the middle by narrow, more or less broken, dark bars (cf. Dickerson, 1906, pl. 73; Wright and Wright, 1933, pl. 58; Smith, 1934, pl. 20). Such intermediate or secondary dark bars are far less developed in specimens of the Gopher Frog from Georgia and Florida (cf. Le Conte, 1855, pl. 5; Dickerson, 1906, pl. 74; Wright and Wright, 1933, pl. 57). This difference appears to furnish an excellent means for separating the Texas and Mississippi Valley species from the southeastern species. The type of *areolata* has the under parts unspotted except along the mandible and the sides of the throat, in this respect agreeing with the above-mentioned specimens from Missouri.

*Rana capito* Le Conte (1855, p. 425) was described from Georgia, "in the ditches of the rice-fields." This doubtless means the vicinity of Riceborough, Liberty County. The type specimen (U. S. N. M., No. 5903) agrees with the plate accompanying the original description. It is an adult in good condition. (Le Conte's statement of its length, "4.2 in.," is probably not an error, although the present length is only 81 mm.; the discrepancy is more likely due to shrinkage. The present measurement of the tibia, 37 mm., agrees exactly with the original measurement of

1.45 in.) The original black parts have become dark brown, but the color pattern is readily distinguishable. The dorsal spots are noticeably smaller and more numerous than in the average specimen of *areolata*. The entire ventral surface, of both body and limbs, is spotted, in this respect differing decidedly from *areolata*.

*Rana areolata aesopus* Cope (1886, p. 517) was based upon a single specimen from Micanopy, Alachua County, Fla. In the preparation of his catalogue of 1889, Cope still had no other specimen of *aesopus*, and the type of *capito* was not before him. The type of *aesopus* (U. S. N. M., No. 4743) is immature or subadult, in its present shrunken condition being only 50 mm. in length. (Cope's original measurement of length was 62; of tibia, 24.) The color pattern is not so well preserved as in the type of *capito*, but in general corresponds very well to that of the latter. The throat and upper breast are spotted. The abdomen is badly preserved and shows no color pattern.

There can be no doubt that the type of *aesopus* and all other specimens from Florida and Georgia are identical with *capito*. In addition to the above-mentioned types, I have examined the following specimens of this species in the U. S. National Museum collection, through the courtesy of Dr. Leonhard Stejneger: Nos. 57533-57535, Levy County, Fla. (J. Hurter); No. 61062, Marion County, Fla. (Reynolds); Nos. 25513-25514, Crescent City, Putnam County, Fla. (H. G. Hubbard); Nos. 59413 and 60576, Auburndale, Polk County, Fla. (N. R. Wood); Nos. 21702-21703, "Florida" (H. G. Hubbard). No. 11897, without locality data and labeled *R. a. areolata*, is definitely *capito*. I have also had before me the following Florida specimens in the collection of the Academy of Natural Sciences of Philadelphia: No. 14617, Pasco County; Nos. 15244-15245, Tarpon Springs, Pinellas County (W. S. Dickinson); and two others with less definite data. Besides examining these museum specimens, I am familiar with the live frog in Charlton County, Ga., and Baker and Nassau Counties, Fla. The throat, breast, and ventral side of the hind limbs in some of the specimens (especially the larger ones) are spotted; apparently the smaller specimens tend to be less spotted on the posterior under parts, but the throat at least seems always to be spotted.

*Rana capito* has long failed of proper recognition by herpetologists. Miss Dickerson (1906, p. 192) synonymizes it with *areolata* on the basis of measurements, making no reference to its color characters. Boulenger, in his account of *areolata*, says (1920, p. 467):

"I have regarded this *R. aesopus* as specifically distinct from *R. areolata*, under the name of *R. capito*. There can be no question that Leconte's figure agrees with *R. aesopus* as defined by Cope and not with *R. areolata*; however, Dr. Barbour has recently informed me that Dr. Stejneger, having at his request reexamined the type of *R. capito*, and compared it with the types of *R. areolata* and *R. aesopus*, states it to be unquestionably the same as *R. areolata* and not *R. aesopus*. I submit of course to Dr. Stejneger's verdict, but considering the state of things resulting from it, it seems to me that a strict definition of the species is an impossibility and I have there-

fore restored *R. aesopus* to the rank of a subspecies or variety of *R. areolata*, assigned to it by its original describer."

From Boulenger's table of measurements (p. 467) it is evident that *areolata* has a relatively narrower head than "*aesopus*." He describes the lower parts of the former as "pale yellow or white"; those of the latter as "white, spotted or vermiculate with brown on the throat and breast." Smith's measurements (1934, p. 479) also indicate that the head is narrower in *areolata* than in *capito*; he states that the ventral surfaces of the former are "immaculate, whitish."

Stejneger and Barbour (1933, p. 38) give the range of *aesopus* as "Florida northward into South Carolina," but include Georgia in the range of *areolata*; they make no reference to *capito*.

Meanwhile, however, there have not been wholly wanting those who maintain belief in the validity of *capito*. An annotation on the card for Le Conte's type in the U. S. National Museum's catalogue indicates such a belief on the part of Percy Viosca, Jr. Wright (1931, p. 350) also expresses belief in the synonymy of *capito* and *aesopus*, but does not carry the matter to a logical nomenclatural conclusion by adopting the earlier name. Wright and Wright (1933, p. 150) show a clear understanding of the distributional facts by excluding *areolata* from the Southeastern States, but still refrain from substituting *capito* for *aesopus*.

*Rana areolata aesopus* Cope is hereby definitely—and I hope finally—sunk in the synonymy of *Rana capito* Le Conte, and Wright and Wright's restriction of *Rana areolata* to Texas and the Mississippi Valley is confirmed.

This disposition of the names accords with the known facts in the ecology of the Gopher Frog. Its primary habitat is the burrows of the Gopher Turtle (*Gopherus polyphemus*). The range of the latter extends in the Coastal Plain from South Carolina and Florida to Arkansas (Stejneger and Barbour, 1933, p. 150). The evidence at hand indicates that the range of *Rana capito* lies wholly within, and the range of *R. areolata* wholly without, that of *Gopherus polyphemus*.

In the absence of any evidence of intergradation—or even of geographical contiguity—*areolata* and *capito* should stand as distinct species.

Just as *capito* owes its common name to the Gopher Turtle with which it associates, so "Crawfish Frog" is a fitting name for *areolata*, by reason of its appropriation of the crustacean's burrows for its own habitations. "Northern Gopher Frog," employed by some authors for *areolata*, is scarcely a suitable name for a species that is not known to have any contact with the Gopher Turtle.

The amount of shrinkage in the length of head and body that seems to have taken place in all three of the type specimens mentioned above, in the 49 to 83 years since their original description, indicates the danger of regarding this as a stable measurement in frogs. The situation is aggravated if the other measurements are expressed as proportions of the head-and-body length, instead of in terms of actual length.

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TEN NEW THYSANOPTERA FROM PANAMA.

BY J. DOUGLAS HOOD,  
*University of Rochester.*

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The types of the new species described below are in the author's collection.

***Tæniothrips silvestris*, sp. nov.**

(Pl. IV, figs. 1, 2.)

*Female* (macropterous).—Length about 1.3 mm. (distended, about 1.6 mm.). Color brown, with bright vermilion internal pigmentation which is more abundant in thorax than elsewhere, head somewhat paler between eyes, abdomen distinguishably darker than pterothorax; legs with all coxæ brown and all tarsi yellow; fore femora yellow at base and heavily overlain with brown on outer surface, the apex and inner surface yellowish; fore tibiæ pale yellowish at base and apex, intermediate portion shaded with brown; middle and hind femora yellow at base, brown beyond, the middle pair more or less yellowish apically; middle and hind tibiæ yellow in narrow basal portion, brown beyond, shading to yellow at apex; fore wings uniform dark brown throughout, save for the usual minute pale spot behind anterior vein and just beyond the basal group of setæ; antennæ dark brown, with basal portion of pedicel of III and narrowed distal portions of III and IV yellow, III-V each with a pale subbasal ring beyond pedicel; setæ on body and wings dark brown; ocellar pigmentation red.

*Head* (Pl. IV, fig. 1) just longer than wide, almost as broad across eyes as across the collar-like thickening at basal third of cheeks, the cheeks slightly arched; vertex somewhat excavated in front of median ocellus, this region and occiput with distinct anastomosing striae; interocellar setæ very long (47  $\mu$ ), situated well within the ocellar triangle; one pair of small setæ in front of median ocellus, a larger pair near inner margin of eyes and laterad of median ocellus, an exceedingly minute pair close to and behind posterior ocelli, three pairs of larger postocular setæ, and two pairs of genal setæ. *Eyes* about 0.6 as long as head and nearly equal in width to their interval. *Ocelli* subequal in size, 18  $\mu$  in diameter, the posterior pair 18  $\mu$  apart and about 15  $\mu$  from median ocellus. *Antennæ* about 2.2 times as long as head, their structure well shown in Pl. IV, fig. 2; segment



IV longer than III and much longer than VI, both III and IV with distal portion narrowed and stalk-like; VIII about four times as long as wide and about one-third the length of III.

*Prothorax* (Pl. IV, fig. 1) 0.9 as long as head and about 1.4 times as wide as long; pronotum distinctly cross-striate with pale, anastomosing lines and with a number of moderately long, slender, dark setæ; setæ at posterior angles dark brown, inner 73  $\mu$ , outer 67  $\mu$ ; posterior margin with 7-9 smaller setæ between the inner pair at angles, the mediad pair stronger and about 28  $\mu$ . *Legs* normal. *Wings* of fore pair about 14 times as long as width at middle; costal margin with about 30 setæ, anterior vein with 4 + 6 (rarely 5, 7, or 8) in basal half and 2 near extreme tip, posterior vein with 15-17 nearly equidistant ones.

*Abdomen* of normal form; terga smooth excepting at sides, where the faint striae are rather widely spaced, VIII with comb missing in median third or less, X not divided above; setæ on IX subequal and about 117  $\mu$ , on X subequal and about 130  $\mu$ .

*Measurements* of paratype ( $\varphi$ ), in mm.: Length about 1.3 (distended, 1.55); head, length 0.151, width across eyes 0.145, across cheeks 0.146, at posterior margin of eyes 0.137, at base 0.137; eyes, length 0.092, width 0.048, interval 0.051; prothorax, length 0.136, width 0.187; pterothorax, width 0.251; fore wings, length 0.778, width at middle 0.053; abdomen, width 0.301.

|                                   |    |    |    |    |    |    |    |    |
|-----------------------------------|----|----|----|----|----|----|----|----|
| Antennal segments:                | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ )                  | 32 | 42 | 60 | 67 | 42 | 58 | 10 | 21 |
| Width ( $\mu$ )                   | 33 | 27 | 25 | 23 | 16 | 17 | 7  | 5  |
| Total length of antenna 0.332 mm. |    |    |    |    |    |    |    |    |

*Male* (macropterous).—Length about 0.95 mm. (distended, 1.20 mm.). Color identical with that of female. Structure very similar, excepting in those details affected by the smaller size, as, for example, the number of setæ on the wing-veins, which is less; tergum VIII with comb complete though weakened medially; tergum IX without large dorsal setæ, its anterior pair of lateral setæ about 90  $\mu$ ; segment X with the lateral setæ 117  $\mu$  and the pair below and posterior to them 107  $\mu$ ; sterna III-VII each with two transverse rows of small pale areas, those in the anterior row on each segment larger, sometimes transversely elliptical, and frequently coalescing here and there to form still larger transverse areas; sternum IV of allotype with 9 circular areas in the posterior row and with three circular areas and two elliptical submedian ones in the anterior row.

*Measurements* of allotype ( $\sigma$ ), in mm.: Length about 0.95 mm.; head, length 0.120, width across eyes 0.122, across cheeks 0.120, at posterior margin of eyes 0.113, at base 0.112; eyes, length 0.073, width 0.041, interval 0.041; interocellar setæ 0.040; prothorax, length 0.106, width 0.158, inner setæ at posterior angles 0.060, outer setæ 0.053, median setæ on posterior margin 0.030; pterothorax, width 0.200; fore wings, length 0.620, width at middle 0.043; abdomen, width 0.202.



|                                |    |    |    |    |    |    |   |    |
|--------------------------------|----|----|----|----|----|----|---|----|
| Antennal segments:             | 1  | 2  | 3  | 4  | 5  | 6  | 7 | 8  |
| Length ( $\mu$ ):              | 23 | 34 | 48 | 55 | 37 | 50 | 9 | 17 |
| Width ( $\mu$ )                | 27 | 24 | 20 | 18 | 14 | 15 | 7 | 5  |
| Total length of antenna 0.273. |    |    |    |    |    |    |   |    |

Described from 27 females and 5 males, all from Barro Colorado Island, C. Z., Panama, July 31–October, 1933, Silvestre Aviles and J. D. H., in flowers of *Dichorisandra hexandra* (Aubl.) Standl. and *Xiphidium cæruleum* Aubl. (both determined by Dr. Paul C. Standley) [Hood Nos. 1027, 1030, 1045, and 1078].

This is one of the few Panamanian Thripidae to be found in deep forests, and in calling it *silvestris* I have in mind, too, the name of Silvestre Aviles, a native Panamanian whose intimate knowledge of the tropical jungle made him a most valuable collecting companion.

The species is allied to the African *funtumia* and *ventralis*, and in the New World finds its closest relatives in *funestus*, described from Texas, and *lagoenacollus*, described from Brazil. From the former it differs most conspicuously in having the pronotum distinctly striated and the fourth antennal segment much longer than the sixth. From the latter, known to me only from the original description, it would appear to be readily separable in the male sex by the long wings and the different disposition of the pale areas on the abdominal sterna, those of *lagoenacollus* being "arranged in an irregular series of 6–7 across each sternite," while the present species has about twice as many, arranged in two distinct rows. Although Moulton states that the modified sterna are II–VI, this is clearly an error because III–VII are the specialized ones in the other species belonging to the same group.

#### ***Adraneothrips bilineatus*, sp. nov.**

*Female* (macropterous).—Length about 1.06 mm. (partially distended, 1.19 mm.). Color pale yellow, with sides and front of head, sides of pro-, meso-, and meta-thorax, and sides of abdominal segments I, III, and IV margined narrowly with dark brown and underlain with bright crimson pigmentation; similar pigmentation at sides of abdominal segments VIII and IX and along posterior margin of dorsal surface of eyes; ocellar pigmentation vermilion red; pronotum with a gray median cloud involving posterior portion, the metanotum at middle and posterior portion of abdominal tergum IX similarly clouded; tube gray-brown, paler in apical portion; all coxæ and tarsi, and the hind tibiæ, uniform pale yellow; femora yellow, the fore pair clouded with gray, especially along inner and outer surfaces, middle and hind femora largely gray-brown, shading to yellow in about basal third and at extreme apex; fore and middle tibiæ yellow, lightly shaded with gray; fore wings yellowish or grayish at base (including scale) and in distal two-fifths, the intervening portion somewhat darker and with a median gray streak which is broadened basally; antennæ with segments I, II, IV, V, VII and VIII largely gray-brown, the intervening ones much paler, II with pedicel and sides darkened, IV and V with basal

fourth (excepting the dark pedicel of V) pale yellowish white, III yellowish white, with a brown cloud crossing the narrow portion beyond pedicel and extending along inner surface, its narrower distal portion lightly clouded, VI with pedicel dark gray and concolorous with apex of V, remainder nearly white basally, shading to gray in distal half.

*Head* long, its length about 1.28 times its greatest width, which is across cheeks, the latter rounded to eyes and roundly converging posteriorly; vertex conically produced between eyes, bearing the overhanging and forwardly directed median ocellus at its extremity; dorsum of head smooth, the darkly colored cheeks with short transverse striæ which give them a minutely serrated appearance; postocular setæ pale yellow, dilated at apex,  $32\ \mu$  long and  $57\ \mu$  apart; other cephalic setæ small, the dorsal ones very slender and pale, the lateral ones shorter, darker, and stouter, one more noticeable pair on profile of cheeks just behind eyes. *Eyes* about 0.4 as long as head, much shorter than their distance from posterior margin of head, their width slightly less than their interval, *on ventral surface of head narrowed posteriorly and prolonged somewhat beyond their dorsal margin.* *Ocelli* obscured by the dense vermilion pigmentation, but clearly anterior in position; median ocellus with its front margin just in advance of that of eyes. *Antennæ* of normal form and structure, segment III with two sense-cones on outer surface. *Mouth-cone* broadly rounded, its tip scarcely attaining posterior margin of prosternum.

*Prothorax* less than one-half as long as head and (inclusive of coxæ) about 2.44 times as wide as long, its surface perfectly smooth excepting a few anastomosing lines along posterior margin; all usual major setæ present and dilated at apex, the three lateral pairs pale brownish and darker than the others, epimerals about  $33\ \mu$ , the others shorter, subequal, and about  $27\ \mu$ . *Pterothorax* somewhat narrower than prothorax across coxæ; metanotum with large, distinct, polygonal reticles in the area of the gray cloud. *Legs* normal; fore tarsi not toothed. *Wings* weak and slender, sparsely fringed, the fore pair with three accessory hairs; subbasal setæ dilated at apex (the distal one less distinctly so) and measuring about 26, 31, and  $41\ \mu$ , respectively.

*Abdomen* narrower than pterothorax, of normal structure; posterior pair of wing-retaining setæ on segments IV–VI larger than the others, the posterior pair on III and IV dark brown in color; I, II, and VII with one pair of dilated, dorso-lateral setæ, III–VI and VIII with two such pairs, the outer pair on VII nearly or quite pointed; homologous pairs on IX nearly pointed and  $62\text{--}65\ \mu$  long; other abdominal setæ pointed; median sclerite of tergum I with two sensory pores on posterior margin; tube about one-half as long as head, twice as long as basal width, and twice as broad at base as at apex, its terminal setæ brownish yellow and about  $60\ \mu$  long.

*Measurements* of holotype (♀), in mm.: Length about 1.06 (partially distended, 1.19); head, length 0.188, greatest width (across cheeks) 0.147, width across eyes 0.133, least width (at base) 0.124; eyes (measurements approximate because of neighboring pigmentation), length 0.074, width 0.043, interval 0.050; prothorax, length 0.090, width (inclusive of coxæ)

0.220; pterothorax, width 0.204; abdomen, width 0.193; tube, length 0.094, width at base 0.048, width at apex 0.023.

|                                   |    |    |    |    |    |    |    |    |
|-----------------------------------|----|----|----|----|----|----|----|----|
| Antennal segments:                | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 25 | 40 | 50 | 52 | 47 | 44 | 38 | 27 |
| Width ( $\mu$ ):                  | 32 | 25 | 25 | 24 | 21 | 19 | 17 | 9  |
| Total length of antenna 0.323 mm. |    |    |    |    |    |    |    |    |

Described from one female taken by the author on a dead palm leaf, Barro Colorado Island, C. Z., Panama, June 26, 1933 [Hood No. 948].

Though the coloration of this species is unique and distinctive, it is nevertheless readily separable from its congeners on the basis of structural characters. *A. huachuca* is the only other member of the genus in which the eyes are prolonged posteriorly on the ventral surface of the head and which at the same time has a pair of pores on the posterior margin of the first abdominal tergum; but, aside from the very different coloration, *huachuca* has the head very much shorter and the antennal segments differently proportioned.

#### *Adraneothrips diligens*, sp. nov.

*Female* (macropterous).—Length about 1.1 mm. (distended, about 1.4 mm.). Bicolourous; head, thorax, and abdominal segments I, IV, and VIII–X brown, the head and sides of pterothorax darkest, the tube paler in distal half, all of these brown portions underlain with more or less crimson pigmentation, this pigmentation nearly continuous in pterothorax and first abdominal segment, confined in prothorax largely to anterior and lateral margins, restricted in head largely to the sides and the region just posterior to ocelli, limited in abdomen to sides of the darker segments, lacking from tube; abdominal segments II and III pale yellow, II often shaded posteriorly, V brown at sides and anteriorly, yellowish posteriorly, with more or less crimson pigmentation laterally, VI and VII bright dark yellow, VII with a brown cloud occupying about median third; legs with coxæ brown and remainder nearly uniform bright pale yellow, the middle femora just distinguishably shaded with gray; wings of fore pair with a gray cloud in second fifth and a dark vein extending to near middle of wing, the basal portion yellowish, distal portion nearly clear; antennæ with segments I, II, VII, and VIII dark gray-brown, II blackish brown at sides and paler along middle, III pale yellowish white, shading to gray in narrowed distal portion, IV–VI yellowish white in basal half, two-fifths, and one-third, respectively (excepting the more or less darkened pedicels), remainder concolorous with VII and VIII; ocellar pigmentation crimson.

*Head* about 1.27 times as long as greatest width, which is across cheeks, these rounding to eyes, straight and converging posteriorly, with faint anastomosing lines which produce a faint serration, dorsum of head smooth; vertex conical; postocular setæ 38  $\mu$ , brown, dilated at apex, 68  $\mu$  apart; other cephalic setæ small. *Eyes* about 0.44 as long as head and nearly as wide as their interval, on ventral surface of head narrowed posteriorly and prolonged slightly beyond their dorsal margin. *Ocelli* of posterior pair about

12  $\mu$  in diameter, 21  $\mu$  apart, and 17  $\mu$  from median ocellus, the latter directed forward, overhanging, and with its front margin just in advance of that of eyes. *Antennæ* of normal form and structure, except that *segment III* has only one sense-cone on outer surface. *Mouth-cone* broadly rounded, its tip about attaining posterior margin of prosternum.

*Prothorax* less than one-half as long as head and (inclusive of coxæ) about 2.65 times as wide as long, its surface perfectly smooth, excepting posteriorly, where there are a few transverse striæ; all usual major setæ present, brown in color, and dilated at apex, the anterior marginals about 33  $\mu$ , anterior laterals 30  $\mu$ , midlaterals 33  $\mu$ , epimerals 40  $\mu$ , posterior marginals 38  $\mu$ , coxals 27  $\mu$ . *Pterothorax* somewhat narrower than prothorax. *Legs* normal; fore tarsi not toothed. *Wings* weak and slender, sparsely fringed, the fore pair with about three accessory setæ; subbasal setæ dilated at apex (the distal one less distinctly so) and measuring about 30, 36, and 57  $\mu$ , respectively.

*Abdomen* narrower than pterothorax, of normal structure; posterior pair of wing-retaining setæ on segment IV especially heavy and dark brown in color, homologous pairs on V and VI yellow and successively smaller, the other wing-retaining setæ weak; I and II with one pair of dilated, dorso-lateral setæ, III–VIII with two such pairs; homologous ones on IX nearly pointed, pale yellowish, and 80–83  $\mu$  long; other abdominal setæ pointed; median sclerite of tergum I with posterior margin rounded and without a pair of sensory pores; tube about 0.58 as long as head, twice as long as basal width, and twice as broad at base as at apex, its terminal setæ brownish yellow and 83  $\mu$  long.

*Measurements* of holotype (♀), in mm.: Length about 1.08 (distended, 1.39); head, length 0.178, greatest width (across cheeks) 0.140, width across eyes 0.134, least width (at base) 0.128; eyes, length 0.079, width 0.044, interval 0.047; prothorax, length 0.082, width (inclusive of coxæ) 0.217; pterothorax, width 0.197; abdomen, width 0.186; tube, length 0.103, width near base 0.050, at apex 0.025.

|                    |    |    |    |    |    |    |    |    |
|--------------------|----|----|----|----|----|----|----|----|
| Antennal segments: | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):  | 27 | 38 | 44 | 47 | 43 | 42 | 40 | 27 |
| Width ( $\mu$ ):   | 30 | 24 | 22 | 22 | 20 | 18 | 17 | 8  |

Total length of antenna 0.308 mm.

*Male* (macropterous).—Length about 0.9 mm. (distended, 1.0 mm.). Color essentially as in female, except that segment VIII of the abdomen is brownish yellow, with a gray cloud at middle, and VII is abundantly pigmented with red. Fore legs not enlarged, fore tarsi unarmed. Sternum VIII with a complete, pale, transverse sensory band of minute, granular-appearing dots, this band crossing the middle of the sclerite and occupying about one-fourth of its length.

*Measurements* of allotype (♂), in mm.: Length about 0.89 (distended, 0.99); head, length 0.153, greatest width (across cheeks) 0.120, width across eyes 0.117, least width at base 0.105; postocular setæ, length 0.032; prothorax, length 0.068, width (inclusive of coxæ) 0.171, anterior marginal setæ 0.024, anterior lateral 0.025, midlateral 0.026, epimeral 0.033, posterior



marginal 0.024, coxal 0.028; pterothorax, width 0.160; abdomen, width 0.137; tube, length 0.080, width at base 0.043, at apex 0.021.

|                                   |    |    |    |    |    |    |    |    |
|-----------------------------------|----|----|----|----|----|----|----|----|
| Antennal segments:                | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 22 | 35 | 40 | 42 | 40 | 36 | 36 | 24 |
| Width ( $\mu$ ):                  | 28 | 21 | 22 | 21 | 20 | 17 | 16 | 8  |
| Total length of antenna 0.275 mm. |    |    |    |    |    |    |    |    |

Described from 13 females and 4 males, all from fallen leaves and dead cut grass, Barro Colorado Island, C. Z., Panama, June 26 (*holotype* and *allotype*) to July 27, 1933, Sabra J. Hook and J. D. H. [Hood Nos. 951, 952, 959, 980, and 1014]; and Frijoles, C. Z., Panama, June 30–July 18, 1933, Sabra J. Hook, Helen H. Hood, James Zetek, and J. D. H. [Hood Nos. 965, 982, and 1001].

This is the only species of the genus with one sense-cone, instead of two, on the outer surface of the third antennal segment. From *alternatus*, to which it bears a remarkably close superficial resemblance, it may be known also by the longer head, the greater ventral extent of the eyes, the darker and more brilliant coloration of the body, the paler, yellow legs, and the less darkened wings.

#### *Adraneothrips albicollis*, sp. nov.

*Female* (macropterous).—Length about 1.04 mm. (distended, 1.27 mm.). Bicolourous; head, pterothorax, and abdominal segments I, IV, V and VIII–X dark brown, the pterothorax narrowly pale along anterior margin and abdominal segments IV and V paler at middle, tube paler apically, the prothorax and abdominal segments II and III nearly white, and abdominal segments VI and VII yellow, the former segment lightly shaded with brown anteriorly, the latter somewhat more darkly shaded with brown posteriorly; legs pale yellowish (nearly white), the fore and middle femora and tibiae lightly shaded with brown; fore wings rather dark brown in basal two-fifths, shading to a very light brown in apical half; antennae brown and about concolorous with head in segments I, II, and IV–VIII, the base of IV perhaps a trifle paler, III nearly uniform pale grayish yellow; ocellar pigmentation maroon-red; fat-body pigmentation red, sparse, scattered along sides of pterothorax.

*Head* unusually long for the genus, its length about 1.39 times its greatest width, which is across cheeks, the latter rounded to eyes, almost perfectly straight and slightly converging to near base, where they are parallel for a short distance and 0.92 their greatest width; dorsum of head elevated along median line in occipital region; vertex conically produced between eyes, bearing the overhanging and forwardly-directed median ocellus at its extremity; dorsum of head smooth, cheeks with short, transverse striae which give them a minutely serrated appearance; postocular setae pale brownish, dilated at apex, 40  $\mu$  long and 78  $\mu$  apart; other cephalic setae minute, slender, and pale, two pairs on sides of vertex between median ocellus and the usual pore, one pair close to and directly behind posterior ocelli, three or four pairs about one-half as far apart as postoculars and

disposed along either side of median line, and about seven pairs on cheeks, two of these last on profile of cheeks, one of them close to eyes, the other at basal third. *Eyes* very small for the genus, only 0.27 the length of head and less than half as long as their distance from posterior margin of head, their width about equal to their interval; on ventral surface of head not narrowed posteriorly nor prolonged beyond their dorsal margin. *Ocelli* anterior in position, median ocellus with its front margin just in advance of that of eyes. *Antennæ* of normal form and structure, segment III with two sense-cones on outer surface. *Mouth-cone* broadly rounded, its tip about attaining posterior margin of prosternum.

*Prothorax* about 0.45 as long as head and (inclusive of coxæ) about 2.5 times as wide as long, its surface perfectly smooth excepting a few faint anastomosing lines along posterior margin; all usual major setæ present, dilated at tip, and yellow in color, the epimerals 40  $\mu$  and longest, anterior laterals and posterior marginals 37  $\mu$ , the others 31–33  $\mu$ , coxals similar in color and form, 20  $\mu$ . *Pterothorax* somewhat narrower than prothorax across coxæ; metanotum with large, indistinct, polygonal reticles in anterior portion. *Legs* normal; fore tarsi not toothed. *Wings* weak and slender, sparsely fringed, the fore pair with three accessory hairs; sub-basal setæ dilated at apex and measuring about 28, 36, and 38  $\mu$ , respectively.

*Abdomen* slightly narrower than pterothorax, of normal structure; posterior pair of wing-retaining setæ on segments IV and V larger than the others, the posterior pair on III–V brown in color; I, II and VII with one pair of dilated, dorso-lateral setæ, III–VI and VIII with two such pairs, the outer pair on VII nearly pointed; homologous pairs on IX nearly pointed, inner 70–77  $\mu$ , outer 82  $\mu$ ; other abdominal setæ pointed; median sclerite of tergum I narrowed posteriorly and without a pair of sensory pores on posterior margin; tube one-half as long as head, about twice as long as basal width, and twice as broad at base as at apex, its terminal setæ pale brown and about 80  $\mu$  long.

*Measurements* of holotype (♀), in mm.: Length about 1.04 (distended, 1.27); head, length 0.174, greatest width (across cheeks) 0.125, width across eyes 0.117, least width (at base) 0.115; eyes, length 0.047, width 0.038, interval 0.042; prothorax, length 0.078, width (inclusive of coxæ) 0.195; pterothorax, width 0.178; abdomen, width 0.175; tube, length 0.087, width at base 0.045, width at apex 0.022.

|                    |    |    |    |    |    |    |    |    |
|--------------------|----|----|----|----|----|----|----|----|
| Antennal segments: | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):  | 22 | 35 | 37 | 41 | 42 | 42 | 40 | 28 |
| Width ( $\mu$ ):   | 26 | 22 | 23 | 22 | 21 | 20 | 17 | 9  |

Total length of antenna 0.287.

Described from one female taken by the author from a dead vine attached to a dead bush, Frijoles, C. Z., Panama, July 7, 1933 [Hood No. 981].

From the other species of the genus which do not have the eyes narrowed and prolonged on the ventral surface of the head, this may readily be known by the lack of sensory pores on tergum I, the long head, and the very small eyes.



**Trichinothrips panamensis, sp. nov.**

*Female* (macropterous).—Length about 1.25 mm. (distended, 1.75 mm.). Color nearly uniform dark brown, with brownish or reddish brown internal pigmentation; femora brown and concolorous with body, tibiae paler, especially at either end, tarsi brownish yellow; wings brownish, the fore pair much darker in anal area (the so-called "scale"), medially paler in basal half, and with margins of outer half somewhat darker; antennae nearly uniform brown, with apical portion of segment II and pedicel of III yellowish.

*Head* 1.23 times as long as greatest width across cheeks, just narrower across eyes, the cheeks gently rounded to eyes and tapering nearly evenly to base, where the width is 0.9 that across widest part of head; surface nearly smooth, with a few transverse anastomosing lines at base; vertex conically produced between eyes, bearing the median ocellus at its apex; postocular setae long ( $72\ \mu$ ), pale, knobbed, situated close to sides of head,  $130\ \mu$  apart at base,  $12\ \mu$  from posterior margins of eyes; other cephalic setae small and pointed, comprising a pair close to sides of median ocellus, a pair at edge of eyes just in front of posterior ocelli, two pairs along inner margins of eyes behind posterior ocelli, an occipital pair behind postoculars and  $76\ \mu$  apart, and about four pairs on cheeks. *Eyes* about 0.43 as long as head, closely and finely faceted. *Ocelli* large, the median one  $19\ \mu$  in diameter, directed upward as well as forward and thus not overhanging, its anterior margin distinctly in advance of that of eyes. *Antennae* stout, 1.6 times as long as head, consisting of seven segments, with a partial, crescentic, pale suture on ventral surface of VII; sense-cones long, large, and pale, disposed as follows on inner (outer) surfaces of segments: III 1 (1), IV 1 ( $2+1$ ), V 1 ( $1+1$ ), VI 1 ( $1+1$ ), VII 1 dorsal, the inner sense-cone on VI longest ( $47\ \mu$ ). *Mouth-cone* broadly rounded at apex, about attaining middle of prosternum.

*Prothorax* along median line of pronotum about one-half as long as head and, across coxae, about 2.5 times as wide as long, its surface nearly smooth, the usual major setae all present, pale, and knobbed, anterior marginals  $61\ \mu$ , anterior laterals  $47\ \mu$ , midlaterals  $63\ \mu$ , epimerals  $80\ \mu$ , posterior marginals  $74\ \mu$ , coxals  $45\ \mu$ ; epimeron largely fused with pronotum. *Legs* rather short, fore pair moderately stout, fore tarsi unarmed. *Wings* of fore pair somewhat broader in basal portion, not narrowed at middle, with 7–9 accessory setae on posterior margin and only two subbasal setae, these pale, knobbed, and  $67$ – $71\ \mu$  long. *Mesonotum* with a pair of pale knobbed setae,  $53\ \mu$  long, near lateral angles; metanotum with a pair of similar setae, these  $60\ \mu$  long,  $76\ \mu$  apart, and  $20\ \mu$  from anterior margin.

*Abdomen* moderately broad and heavy, about 1.67 times as broad as prothorax across coxae, its surface nearly smooth; tergum II large, rather deeply emarginate for the reception of I; tube very short, scarcely 0.44 as long as head, somewhat broadened in basal fourth, thence with sides slightly concave, its length only 1.4 its greatest width, this about twice the width at apex; major abdominal setae all pale, mostly knobbed, the dorsal pair on tergum IX about  $85\ \mu$  in length and thus subequal to tube, the terminal setae light brown,  $117\ \mu$ .

*Measurements of holotype (♀), in mm.:* Length about 1.25 (distended, 1.75); head, length 0.197, greatest width (across cheeks) 0.160, width across eyes 0.157, least width (at base) 0.143; eyes, length 0.085; prothorax, median length of pronotum 0.100, width (inclusive of coxæ 0.252); pterothorax, width 0.266; abdomen, width 0.294; abdominal tergum VIII, length 0.073, IX 0.054; tube, length 0.086, width at base 0.061, at apex 0.031.

|                                   |    |    |    |    |    |    |    |
|-----------------------------------|----|----|----|----|----|----|----|
| Antennal segments:                | 1  | 2  | 3  | 4  | 5  | 6  | 7  |
| Length ( $\mu$ ):                 | 28 | 48 | 45 | 51 | 43 | 42 | 58 |
| Width ( $\mu$ ):                  | 35 | 28 | 30 | 31 | 27 | 27 | 23 |
| Total length of antenna 0.315 mm. |    |    |    |    |    |    |    |

Described from one female, Barro Colorado Island, Canal Zone, Panama August 14, 1933, J. D. Hood, from a grass, *Axonopus compressus* (Swartz) Beauv., determined by Dr. Paul C. Standley [Hood No. 1058].

For placing this in *Trichinothrips*, the author is indebted to Dr. H. Priesner, who has studied the unique type. The genus has been known previously from two species, *T. branderi*, described from one male taken in a leaf gall in the Federated Malay States, and *T. breviceps*, described from a "very imperfect specimen," also a male, with "joints 6-8 of both antennæ and all the legs excepting the left fore-leg—missing," observed feeding upon a Psocid in Ceylon. Both of these have relatively longer tubes than the present species, and the head in both is nearly 1.3 times as wide as long; in *panamensis* the head is only 0.81 as wide as long. To permit the inclusion of the present species in *Trichinothrips*, the generic definition requires modification by changing "head transverse" to "head transverse or somewhat longer than broad."

#### *Liothrips araliæ*, sp. nov.

*Female* (macropterous).—Length about 2.8 mm. (partially distended, 3.14 mm.). Color blackish brown or black, with tarsi, tips of tibiæ, and distal third of tube lighter; antennæ with segments I and II blackish brown, the distal portion of II yellowish, III yellow, with darker pedicel and lightly clouded apex, IV-VIII nearly blackish brown, with apices of IV-VII and outer surface of distal half of IV somewhat paler; fore wings dark brown in anal area or "scale" and across entire base to the last subbasal seta, lightly clouded with brown beyond, with margins narrowly darker and a median brown bar extending nearly to apex.

*Head* 1.56-1.7 times as long as wide (averaging 1.61), usually just perceptibly broader across cheeks at posterior margin of eyes than across the latter, the cheeks almost perfectly parallel to near base, then constricted to somewhat less than 0.9 the greatest width and flared slightly outward at extreme base; vertex roundly produced, polygonally subreticulate, the forwardly-directed median ocellus overhanging and with its anterior margin nearly or just attaining the front; remainder of dorsal and lateral surfaces of head, excepting only a small area between eyes and behind ocelli, distinctly cross-striate with anastomosing lines which produce little or no serration in the silhouette of the cheeks as seen from above;

postocular setæ blackish brown, blunt or very slightly broadened at apex, in the holotype about 117  $\mu$  long, 177  $\mu$  apart, and 40  $\mu$  from posterior margin of eyes; other cephalic setæ minute. *Eyes* rounded, about one-third the length of head, not protruding, broadest behind ocelli, very slightly longer and narrower on ventral surface of head. *Ocelli* of posterior pair 35  $\mu$  in diameter and 37  $\mu$  apart, their posterior margin distinctly in advance of middle of eyes. *Antennæ* about 1.8 times as long as head, with the normal number and arrangement of sense-cones, the segments long, III 120–151  $\mu$  in length, VIII pointed at tip rather than rounded. *Mouth-cone* semicircularly rounded at apex and short, the distance between the posterior dorsal margin of head at median line and the tip of labrum only slightly more than one-half the median dorsal length of head.

*Prothorax* about 0.46 as long as head and (inclusive of coxæ) about 2.76 times as broad as long, its surface smooth excepting for a small patch of transverse striæ in front of each posterior marginal seta and one or two longer ones near posterior margin; all major setæ present, nearly black in color and blunt at tip, quite variable in length, in the holotype measuring as follows: anterior marginal 84  $\mu$ , anterior lateral 70  $\mu$ , midlateral 91  $\mu$ , epimeral 164  $\mu$ , posterior marginal 150  $\mu$ , coxal 81  $\mu$ ; inner seta on epimeron very minute. *Fore legs* normal. *Fore wings* normal, with about 20 accessory setæ, the three subbasal setæ nearly black, blunt, and in the holotype measuring 92, 120, and 128  $\mu$ . *Metanotum* finely and inconspicuously subreticulate, the reticles in its posterior portion elongated and disposed in more or less regular longitudinal rows.

*Abdomen* broadest at segments II or III, lightly subreticulate in median plate of tergum I, less distinctly sculptured in II and in successively smaller transverse areas at sides of III–VI, the lines in these latter areas asperate; setæ all dark, the one or two dorso-lateral pairs on I–IV and the inner of these on V–VIII, all blunt, the outer pair on V–VIII and the three long subequal pairs on IX very nearly or quite pointed; inner (and outer) pairs measuring as follows in holotype ( $\mu$ ): VI 168 (210), VII 176 (224), VIII 100 (156); on IX, inner 316, middle 336, outer 325; tube about 0.81 as long as head, three times as long as its greatest subbasal width, and nearly twice as broad near base as at apex, its terminal setæ about 266  $\mu$ .

*Measurements* of holotype ( $\varphi$ ), in mm.: Length about 2.79 (partially distended, 3.14); head, length 0.396, greatest width across cheeks 0.246, across eyes 0.242, least width near base 0.214; eyes, length 0.130, width 0.078, interval 0.085; prothorax, length 0.182, width (inclusive of coxæ) 0.504; pterothorax, width 0.546; abdomen, width at segment III 0.550; tube, length 0.322, width near base 0.107, at apex 0.055.

|                                   |                 |    |     |     |     |    |    |    |
|-----------------------------------|-----------------|----|-----|-----|-----|----|----|----|
| Antennal segments:                | 1               | 2  | 3   | 4   | 5   | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 44 <sup>1</sup> | 75 | 137 | 118 | 108 | 99 | 78 | 47 |
| Width ( $\mu$ ):                  | 49              | 37 | 37  | 47  | 41  | 37 | 27 | 16 |
| Total length of antenna 0.706 mm. |                 |    |     |     |     |    |    |    |

*Male* (macropterous).—Length about 2.4 mm. (fully distended, about 3 mm.). Color as in female; structure differing as follows: *Head* 1.62–1.67

<sup>1</sup> Dorsal length.

times as long as width across eyes and 1.67–1.73 times as long as greatest width across cheeks, the latter straight and distinctly converging posteriorly, rather abruptly constricted near base to about 0.78 the greatest width, flared slightly outward at extreme base; postocular setæ of allotype 103  $\mu$  long, 143  $\mu$  apart, and 43  $\mu$  from posterior margin of eyes. *Eyes* distinctly protruding. *Ocelli* of posterior pair about 32  $\mu$  in diameter and 28  $\mu$  apart. *Antennæ* about 1.9 times as long as head, segment III 115–127  $\mu$ . *Mouth-cone* semicircularly rounded at apex, about one-half the dorsal length of head. *Prothorax* about as in female; setæ of allotype measuring as follows: anterior marginals 62–76  $\mu$ , anterior laterals 57  $\mu$ , midlaterals 95  $\mu$ , epimerals 133  $\mu$ , posterior marginals 116  $\mu$ , coxals 67  $\mu$ ; inner seta on epimeron very minute. *Legs* and *wings* normal; fore wings with about 19 accessory hairs and with the three subbasal setæ measuring 77, 93, and 97  $\mu$ , respectively. *Abdomen* much like that of female, but with shorter setæ; middle pair of setæ at apex of segment IX not reduced in size, but subequal in length to others; tube about 0.81 as long as head, slightly more than three times as long as its greatest subbasal width, and nearly twice as broad near base as at apex, its terminal setæ about 224  $\mu$ .

*Measurements* of allotype ( $\sigma^7$ ), in mm.: Length about 2.37 (fully distended, 2.98); head, length 0.364, greatest width (across eyes) 0.224, across cheeks 0.217, least width near base 0.169; eyes, length 0.118, width 0.075, interval 0.076; prothorax, length 0.171, width (inclusive of coxæ) 0.444; pterothorax, width 0.462; abdomen, width 0.420; tube, length 0.297, width near base 0.094, at apex 0.049.

|                                   |                 |    |     |     |     |     |    |    |
|-----------------------------------|-----------------|----|-----|-----|-----|-----|----|----|
| Antennal segments:                | 1               | 2  | 3   | 4   | 5   | 6   | 7  | 8  |
| Length ( $\mu$ ):                 | 40 <sup>2</sup> | 68 | 127 | 120 | 114 | 100 | 76 | 42 |
| Width ( $\mu$ ):                  | 46              | 33 | 33  | 40  | 34  | 33  | 24 | 14 |
| Total length of antenna 0.687 mm. |                 |    |     |     |     |     |    |    |

Described from 8 females and 4 males, all from Barro Colorado Island, C. Z., Panama. Seven females and one male, including the holotype and allotype, were taken July 15, 1933, by the writer, on leaves of an aralia, *Nothopanax guilfoylei* (Cogn. & Marché) Merrill [Hood No. 983], while one female was found by Miss Sabra J. Hook among dead, fallen *Cecropia* leaves, June 28, 1933 [Hood No. 959].

The relative length and breadth of the head and the dark fourth antennal segment separate this species readily from all others known from the Neotropical realm, with the exception of *antennatus*, *bondari*, *anonæ*, and the two new species described below as *penetralis* and *avocadis*. From *antennatus* it differs most conspicuously in the sculpture of the metanotum, which in that species is composed of nearly equilateral polygons, not arranged in longitudinal rows in the posterior part of the sclerite; from *bondari* and *anonæ* it may be known by the length of the setæ on the anterior margin of the pronotum as well as by the longer sixth antennal segment; while from *penetralis* and *avocadis* it is readily distinguished by the short and broadly rounded mouth-cone.

<sup>2</sup> Dorsal length.



The plant upon which it occurs in abundance is commonly planted for ornament in tropical America, and is a common hedge in the Canal Zone. The origin of the plant is thought to be Polynesia or the East Indies, and I had expected to find the thrips a well-known or at least described species; yet it can not be identified with any known *Liothrips*, or with any of the numerous species of *Gynaikothrips*—a genus to which it could be assigned without violence to our definitions.

***Liothrips penetralis*, sp. nov.**

*Female* (macropterous).—Length about 2.4 mm. (distended, about 3.2 mm.). Color blackish brown or black, with tarsi, knees, and distal fourth of tube somewhat lighter; antennæ with segments I and II blackish brown, the distal portion of II yellowish, III yellow, lightly clouded apically, IV–VIII blackish brown, with apices of IV–VII and outer surface of distal portion of IV usually somewhat paler; fore wings dark brown in anal area or “scale” and with an equally dark median bar extending from base to near apex of wing, this bar broadest at base, involving the origins of the three subbasal setæ, and palest just beyond the subbasal setæ, the remainder of wing lightly clouded with brown, usually somewhat more darkly along posterior margin.

*Head* 1.48–1.59 times as long as wide (averaging 1.55), just perceptibly broader across cheeks behind posterior margin of eyes than across the latter, the cheeks slightly convex and converging to (rather than constricted) near base, where the width of the head is about 0.87 its greatest width, the cheeks then flared slightly outward at extreme base; vertex roundly produced, surpassing the base of the first antennal segment, polygonally subreticulate, the forwardly-directed median ocellus overhanging and with its anterior margin always distinctly in advance of front of head; dorsal and lateral surfaces of head cross-striate with anastomosing lines which produce a slight and irregular serration of the cheeks as seen from above; postocular setæ blackish brown, blunt or very slightly broadened at apex, usually about  $124\ \mu$  ( $94$ – $137\ \mu$ ) long, about  $140\ \mu$  apart, and  $24\ \mu$  from posterior margin of eyes; other cephalic setæ minute. *Eyes* rounded, about 0.29 the length of head, not protruding, broadest behind ocelli, very slightly longer but not wider on ventral surface of head. *Ocelli* of posterior pair  $23\ \mu$  in diameter and  $38\ \mu$  apart, their posterior margin decidedly in advance of middle of eyes. *Antennæ* about 1.8 times as long as head, with the normal number and arrangement of sense-cones, the segments normal in form, III  $110$ – $124\ \mu$  in length (averaging  $115\ \mu$ ), VIII nearly pointed at tip, rather than rounded. *Mouth-cone* pointed at tip and very long, the distance between the posterior dorsal margin of head at median line and the tip of labrum 0.92–0.97 the median dorsal length of head.

*Prothorax* about 0.52 as long as head and (inclusive of coxæ) about 2.77 times as broad as long, its surface smooth excepting two or three long striæ near posterior margin and sometimes a small patch of shorter ones in front of each posterior marginal seta; all major setæ present, nearly black in color



and blunt at tip, distinctly variable in length; anterior marginal and anterior lateral pairs usually about 60  $\mu$ , midlaterals 70  $\mu$ , epimerals 133–154  $\mu$ , posterior marginals 154–182  $\mu$ , coxals about 55  $\mu$ ; inner seta on epimeron usually minute, though occasionally 37–45  $\mu$ . *Legs* normal. *Fore wings* normal, with 16–22 accessory setae, the three subbasal setae nearly black, blunt, in the holotype measuring respectively 80, 103, and 97  $\mu$ . *Metanotum* rather strongly and (in caustic-treated specimens) conspicuously subreticulate, the reticles as distinct in middle of sclerite as at sides, more or less elongated, and disposed rather generally in longitudinal rows.

*Abdomen* broadest at segments II or III, lightly subreticulate in median plate of tergum I, less distinctly sculptured in II and in successively smaller transverse areas at sides of III–VI, the lines in these latter areas scarcely asperate; setae (including those on IX) nearly black, the one or two dorsolateral pairs on I–IV and VIII and the inner of these on V–VII, all blunt, the outer pair on V–VII and the three long subequal pairs on IX very nearly or quite pointed; inner (and outer) pairs measuring as follows ( $\mu$ ) in one of the paratypes: VI 162 (168), VII 156 (171), VIII 98 (106); on IX inner 280, middle 280, outer 252  $\mu$ ; tube about 0.83 as long as head, 2.7 times as long as its greatest subbasal width, and nearly twice as broad near base as at apex, its terminal setae about 210  $\mu$ .

*Measurements* of paratype ( $\varphi$ ), in mm.: Length about 2.42 (distended, 3.17); head, length 0.322, width across eyes 0.204, greatest width across cheeks 0.207, least width near base 0.181; eyes, length 0.095, width 0.064, interval 0.079; prothorax, length 0.167, width (inclusive of coxae) 0.462; pterothorax, width 0.518; abdomen, width 0.525; tube, length 0.270, width near base 0.100, at apex 0.053.

|                                   |                 |    |     |    |    |    |    |    |
|-----------------------------------|-----------------|----|-----|----|----|----|----|----|
| Antennal segments:                | 1               | 2  | 3   | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 53 <sup>3</sup> | 63 | 110 | 90 | 83 | 71 | 67 | 40 |
| Width ( $\mu$ ):                  | 44              | 37 | 37  | 43 | 38 | 36 | 31 | 16 |
| Total length of antenna 0.577 mm. |                 |    |     |    |    |    |    |    |

*Male* (macropterous).—Length about 2.4 mm. (distended, 3.07 mm.). Color as in female; in structure departing from above description only as follows: *Head* 1.6–1.7 times as long as greatest width, which is usually across eyes; cheeks straight and converging to about their basal fourth, thence roundly converging to near base, where the width is 0.77–0.8 the greatest width, then broadened again at extreme base; median ocellus usually slightly surpassing front of head; postocular setae 98–120  $\mu$  long, 126–140  $\mu$  apart, and 26–35  $\mu$  from posterior margin of eyes; eyes almost always slightly protruding, distinctly longer and just wider on ventral surface of head; ocelli of posterior pair about 27  $\mu$  in diameter and 41  $\mu$  apart; antennal segment III 97–127  $\mu$  (averaging 113  $\mu$ ); mouth-cone (measured as noted above) relatively much shorter than in female, usually 0.71–0.75 the median dorsal length of head, though rarely only 0.66 as long. *Prothorax* with anterior marginal and anterior lateral setae short, usually 50–55  $\mu$ , midlaterals about 77  $\mu$ , epimerals 101–133  $\mu$ , posterior marginals

<sup>3</sup> Ventral length.

73–115  $\mu$ ; fore wings with 11–20 accessory setæ. *Abdomen* with inner (and outer) pairs of setæ measuring as follows in one paratype ( $\mu$ ): VI 141 (140), VII 138 (143), VIII 97 (100); on IX all three pairs subequal, 294–308  $\mu$ , all dark in color as in female; tube about 0.8 as long as head, three times as long as greatest subbasal width, scarcely twice as wide near base as at apex, its terminal setæ about 217  $\mu$ .

*Measurements* of paratype ( $\sigma$ ), in mm.: Length about 2.39 (distended, 3.07); head, length 0.356, width across eyes 0.211, greatest width across cheeks 0.204, least width near base 0.162; eyes, length 0.100, width 0.067, interval 0.077; prothorax, length 0.154, width (inclusive of coxæ) 0.445; pterothorax, width 0.448; abdomen, width 0.434; tube, length 0.280, width near base 0.093, near apex 0.048.

|                                   |                 |    |     |    |    |    |    |    |
|-----------------------------------|-----------------|----|-----|----|----|----|----|----|
| Antennal segments:                | 1               | 2  | 3   | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 55 <sup>4</sup> | 65 | 114 | 97 | 90 | 80 | 69 | 48 |
| Width ( $\mu$ ):                  | 43              | 36 | 35  | 40 | 37 | 33 | 28 | 16 |
| Total length of antenna 0.618 mm. |                 |    |     |    |    |    |    |    |

Described from 9 females and 7 males, all taken by the writer on Barro Colorado Island, C. Z., Panama, August 6–14, 1933, among young terminal leaves of a plant which Dr. Paul C. Standley believes is probably a species of *Trichilia*.

The very long mouth-cone of the female permits the immediate recognition of this species. *L. bondari* has much shorter, *anonæ* much longer, prothoracic setæ; *zeteki* has the head proportionately shorter; *antennatus* has much longer antennal segments. The closest relative of *penetratis*, however, is the species described immediately below as *avocadis*, and I doubt whether proper separation could be made in poorly mounted material. The present species differs constantly in the much longer mouth-cone, somewhat shorter head, smaller ocelli, color of the fore wings and abdominal setæ, and sculpture of the metanotum.

#### *Liothrips avocadis*, sp. nov.

*Female* (macropterous).—Length about 2.5 mm. (distended, 3.2 mm.). Color blackish brown or black, with tarsi, knees, and distal third of tube somewhat lighter; antennæ with segments I and II blackish brown, the distal portion of II yellowish brown, III yellow, IV–VIII blackish brown, with apical portion of IV, especially on outer surface, paler and mottled with yellowish; fore wings brown in anal area or “scale” and with an equally dark median bar from base to near apex of wing, this bar not broadened at base and separated from the origins of the three subbasal setæ by a pale area which is continued along wing close to front margin, the remainder of wing lightly clouded with brown and with a dark area along posterior margin.

*Head* 1.58–1.67 times as long as wide (averaging 1.63), just perceptibly broader across cheeks behind posterior margin of eyes than across the latter, the cheeks very slightly convex and converging to near base (rather

<sup>4</sup> Ventral length.

than constricted), the least width of the head at this point 0.80–0.85 its greatest width, the cheeks then flared slightly outward at extreme base; vertex roundly produced, slightly surpassing the base of the first antennal segment, polygonally subreticulate, the forwardly-directed median ocellus overhanging and with its anterior margin always distinctly in advance of front of head; dorsal and lateral surfaces of head cross-striate with anastomosing lines which produce a slight and irregular serration of the cheeks as seen from above; postocular setæ blackish brown, blunt or very slightly broadened at apex, usually about 120  $\mu$  long, about 153  $\mu$  apart, and 30  $\mu$  from posterior margin of eyes; other cephalic setæ minute. *Eyes* about 0.3 the length of head, not protruding, broadest behind ocelli, very slightly longer and wider on ventral surface of head. *Ocelli* of posterior pair 30  $\mu$  in diameter and 37  $\mu$  apart, their posterior margin decidedly in advance of middle of eyes. *Antennæ* about 1.75 times as long as head, with the normal number and arrangement of sense-cones, the segments normal in form, III 103–115  $\mu$  in length (averaging 109  $\mu$ ), VIII nearly pointed at tip, rather than rounded. *Mouth-cone* pointed at tip and long, the distance between the posterior dorsal margin of head at median line and the tip of labrum 0.79–0.87 the median dorsal length of head (averaging 0.825).

*Prothorax* about 0.47 as long as head and (inclusive of coxæ) about 2.9 times as broad as long, its surface smooth excepting for a few long striæ near posterior margin and usually a small patch of shorter ones in front of each posterior marginal seta; all major setæ present, nearly black in color and blunt at tip, variable in length, measuring as follows in one paratype: anterior marginals 60  $\mu$ , anterior laterals 55  $\mu$ , midlaterals 92  $\mu$ , epimerals 147  $\mu$ , posterior marginals 150  $\mu$ , coxals 58  $\mu$ ; inner seta on epimeron usually minute, very rarely 30–77  $\mu$ . *Legs* normal. *Fore wings* normal, with 15–20 accessory setæ (averaging 17), the three subbasal setæ nearly black, blunt, and variable in length, in the holotype measuring respectively 73–77, 100–101, and 105–112  $\mu$  on the two wings. *Metanotum* almost perfectly smooth medially between the pair of major setæ, rather lightly subreticulate elsewhere, the reticles more or less elongated and disposed in fairly regular longitudinal rows.

*Abdomen* broadest at segment III, lightly subreticulate in median plate of tergum I, less distinctly sculptured in II and in successively smaller transverse areas at sides of III–VI, the lines in these latter areas scarcely asperate; setæ at apex of segment IX pale and pointed, the dorsal pair of these white, the other two pairs yellowish, all other abdominal setæ blackish brown to black and, excepting the terminal ones, blunt at tip; inner (and outer) pairs measuring as follows in one of the paratypes ( $\mu$ ): VI 182 (156), VII 163 (190), VIII 103 (127); on IX, inner 266, middle 294, outer 266; tube about 0.78 as long as head, 2.8 times as long as its greatest subbasal width, and nearly twice as broad near base as at apex, its terminal setæ about 245  $\mu$ .

*Measurements* of paratype ( $\varphi$ ) in mm.: Length about 2.48 (distended, 3.22); head, length 0.361, width across cheeks 0.223, across eyes 0.213, least width near base 0.181; eyes, length 0.107, width 0.067, interval 0.080; prothorax, length 0.169, width (inclusive of coxæ) 0.490; pterothorax, width

0.518; abdomen, width 0.554; tube, length 0.280, width at base 0.100, at apex 0.053.

|                                   |                 |    |     |     |    |    |    |    |
|-----------------------------------|-----------------|----|-----|-----|----|----|----|----|
| Antennal segments:                | 1               | 2  | 3   | 4   | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 60 <sup>5</sup> | 72 | 110 | 100 | 95 | 79 | 72 | 43 |
| Width ( $\mu$ ):                  | 46              | 40 | 36  | 42  | 38 | 37 | 30 | 17 |
| Total length of antenna 0.631 mm. |                 |    |     |     |    |    |    |    |

*Male* (macropterous).—Length about 2.1 mm. (distended, about 2.5 mm.). Color as in female; in structure departing from above description only as follows: *Head* 1.65–1.76 times as long as greatest width, which is usually behind eyes, its least subbasal width 0.75–0.8 its greatest width (averaging 0.78); postocular setæ shorter, usually about 103  $\mu$  long (90–110), 133  $\mu$  apart (131–135), and 23  $\mu$  from posterior margin of eyes; ocelli about 24  $\mu$  in diameter and 32  $\mu$  apart; antennæ about 1.7 times as long as head, segment III 91–109  $\mu$  (averaging 99  $\mu$ ); mouth-cone 0.69–0.72 as long as head (when measured as described above). Prothorax about 0.42 as long as head; setæ shorter than in female, measuring as follows in one specimen: anterior marginals 57  $\mu$ , anterior laterals 43  $\mu$ , midlaterals 64  $\mu$ , epimerals 103  $\mu$ , posterior marginals 113  $\mu$ ; fore wings with 14–17 (usually 15) accessory setæ, the subbasal setæ in one paratype measuring 69, 83 and 91  $\mu$ , respectively. *Abdomen* broadest at segment II; setæ at apex of segment IX pale as in female, all three pairs subequal in length (252–280  $\mu$ ); inner (and outer) setæ measuring as follows in one paratype ( $\mu$ ): VI 133 (158), VII 130 (151), VIII 94 (105); terminal setæ about 203  $\mu$ .

*Measurements* of paratype ( $\sigma^7$ ), in mm.: Length about 2.11 (distended, 2.45); head, length 0.332, width across cheeks 0.199, across eyes 0.196, near base 0.153; eyes, length 0.098, width 0.064, interval 0.068; prothorax, length 0.141, width (inclusive of coxæ) 0.392; pterothorax, width 0.420; abdomen, width 0.400; tube, length 0.255, width at base 0.089, at apex 0.047.

|                                |                 |    |    |    |    |    |    |    |
|--------------------------------|-----------------|----|----|----|----|----|----|----|
| Antennal segments:             | 1               | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):              | 48 <sup>6</sup> | 63 | 96 | 91 | 86 | 76 | 65 | 38 |
| Width ( $\mu$ ):               | 40              | 36 | 32 | 38 | 34 | 32 | 26 | 15 |
| Total length of antenna 0.563. |                 |    |    |    |    |    |    |    |

Described from 16 females and 7 males, taken by Mr. James Zetek at Ancon, Canal Zone, Panama, August 24, 1933, on avocado (*Persea americana* Mill.) [Hood No. 1064].

This species differs from its described congeners in the same ways as *penetralis*, described above; and its separation from that species has been adequately treated.

#### *Liothrips cordiæ*, sp. nov.

*Female* (macropterous).—Length about 2 mm. (partially distended, 2.5 mm.). Color blackish brown or black, with tarsi and distal fourth of tube somewhat lighter; antennæ with segments I and II blackish brown, the

<sup>5</sup> Ventral length.

<sup>6</sup> Ventral length.



distal portion of II yellowish brown, III yellow and lightly shaded across apex, IV–VIII nearly black, with outer distal portion of IV mottled with brown; fore wings dark brown across base,—this area extending to the third subbasal seta and including the anal area ("scale"),—and with a dark median bar extending to near tip of wing, this bar paler than, and not distinctly connected with, the basal area, posterior margin of wing with a much narrower dark band which anteriorly is edged with darker and separated from the dark median bar by a nearly colorless interval, the costal portion of wing light brownish.

*Head* about 1.32 times as long as wide in holotype, distinctly broader across anterior portion of cheeks than across eyes; cheeks convex, slightly rounded to eyes, more strongly rounded to near base, and flared outward at extreme base, the least subbasal width of head about 0.82 the greatest width; vertex roundly produced, slightly surpassing the base of the first antennal segment, polygonally subreticulate, the forwardly directed median ocellus overhanging and with its anterior margin distinctly in advance of front of head when the latter is perfectly horizontal; remainder of dorsal and lateral surfaces of head cross-striate with anastomosing lines which produce a distinct serration of the cheeks as seen from above; postocular setæ nearly black, blunt but nearly pointed, 70–87  $\mu$  long, about 134  $\mu$  apart, and about 25  $\mu$  from posterior margin of eyes; other cephalic setæ minute. *Eyes* not protruding, slightly more than one-third the length of head, broadest just behind ocelli, somewhat longer and narrower on ventral surface of head. *Ocelli* of posterior pair 26  $\mu$  in diameter and 32  $\mu$  apart, their posterior margin decidedly in advance of middle of eyes. *Antennæ* about 1.84 times as long as head, with the normal number and arrangement of sense-cones, the segments normal in form, III 77–88  $\mu$  (averaging 81  $\mu$ , holotype 81  $\mu$ ). *Mouth-cone* pointed at tip, the distance between posterior dorsal margin of head at median line and the tip of labrum about 0.8 the median dorsal length of head.

*Prothorax* about 0.5 the length of head and (inclusive of coxæ) about 2.9 times as broad as long, its surface smooth excepting the cross-striate posterior margin and a small patch of striæ in front of each posterior marginal seta; all major setæ present, nearly black in color and scarcely pointed at tip, measuring as follows in one paratype: anterior marginals and anterior laterals 31  $\mu$ , midlaterals 30  $\mu$ , epimerals 100  $\mu$ , posterior marginals 80  $\mu$ , coxals 33  $\mu$ ; inner seta on epimeron minute. *Legs* normal. *Fore wings* normal, with 12–15 accessory setæ (averaging 13), the three subbasal setæ nearly black, scarcely pointed, and variable in length, in the holotype measuring 55, 70, and 69  $\mu$ , respectively. *Metanotum* much less weakly sculptured medially between the pair of major setæ than elsewhere, the remainder subreticulate, the reticles more or less elongated and disposed in fairly regular longitudinal rows.

*Abdomen* broadest at segment IV, lightly subreticulate in median plate of tergum I, cross-striate with anastomosing lines at sides of the more basal segments and across base of II; all setæ nearly black, excepting those at apex of IX, which are brownish yellow, the terminal setæ, those on IX, and usually the lateral pair on VII pointed, the others blunt; inner (and outer)



pairs measuring as follows in one paratype: VI 127 (126), VII 163 (167), VIII 67 (100); on IX, inner 176, middle 178, outer 206; tube about 0.84 as long as head, 2.6 times as long as its greatest subbasal width, and twice as broad near base as at apex, its terminal setæ about 196  $\mu$ .

*Measurements* of paratype ( $\varphi$ ), in mm.: Length about 2.02 (distended 2.48); head, length 0.270, greatest width (across cheeks) 0.205, across eyes 0.192, least width near base 0.167; eyes length 0.092, width 0.059, interval 0.075; prothorax, length 0.137, width (inclusive of coxæ) 0.399; pterothorax, width 0.420; abdomen, width 0.480; tube, length 0.228, width near base 0.087, at apex 0.043.

|                                   |                 |    |    |    |    |    |    |    |
|-----------------------------------|-----------------|----|----|----|----|----|----|----|
| Antennal segments:                | 1               | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 51 <sup>7</sup> | 62 | 78 | 77 | 72 | 68 | 56 | 32 |
| Width ( $\mu$ ):                  | 41              | 33 | 30 | 38 | 33 | 32 | 26 | 14 |
| Total length of antenna 0.496 mm. |                 |    |    |    |    |    |    |    |

*Male* (macropterous).—Length about 1.6 mm. (distended, 2.0 mm.). Color as in female; in structure departing from above description only as follows: Postocular setæ 43–60  $\mu$ , about 117  $\mu$  apart, and about 17  $\mu$  from posterior margin of eyes; ocelli of posterior pair 23  $\mu$  in diameter and 26  $\mu$  apart; antennal segment III 74–77  $\mu$ ; mouth-cone (measured as described above) 0.61–0.70 as long as head; prothoracic setæ measuring as follows in one paratype ( $\mu$ ): anterior marginals 21, anterior laterals 29, midlaterals 38, epimerals 75, posterior marginals 70, coxals 30; fore wings with 9–14 (averaging 11.5) accessory setæ, the subbasal setæ measuring in one paratype 50, 48, and 50  $\mu$ , respectively; abdominal segment IX with inner pair of setæ dark brown and about 176  $\mu$ , middle pair dark brown and only 40  $\mu$ , outer pair pale yellowish and about 216  $\mu$ ; inner (and outer) setæ measuring as follows: VI 104 (77), VII 120 (130), VIII 58 (87); terminal setæ about 170  $\mu$ .

*Measurements* of paratype ( $\sigma$ ), in mm.: Length about 1.61 (distended, 2.03); head, length 0.245, greatest width (across cheeks) 0.179, across eyes 0.174, least width near base 0.145; eyes, length 0.087, width 0.056, interval 0.063; prothorax, length 0.117, width (inclusive of coxæ) 0.338; pterothorax, width 0.358; abdomen, width 0.360; tube, length 0.203, width at base 0.076, at apex 0.037.

|                                   |                 |    |    |    |    |    |    |    |
|-----------------------------------|-----------------|----|----|----|----|----|----|----|
| Antennal segments:                | 1               | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):                 | 45 <sup>8</sup> | 54 | 77 | 71 | 67 | 62 | 50 | 30 |
| Width ( $\mu$ ):                  | 38              | 30 | 27 | 36 | 32 | 31 | 24 | 13 |
| Total length of antenna 0.456 mm. |                 |    |    |    |    |    |    |    |

Described from 14 females and 5 males, all from Barro Colorado Island, C. Z., Panama, taken July 30, 1933, on leaves of *Cordia nitida* Jacq. (det. by Dr. Paul C. Standley), J. D. H. [Hood No. 1026], *holotype*, *allotype*, and *paratypes*; and also in October, 1933, on leaves of *Casearia sylvestris* Swartz (det. by Standley), Silvestre Aviles [Hood No. 1086], *paratypes*.

<sup>7</sup> Ventral length.

<sup>8</sup> Ventral length.

The short head and antennal coloration place this in a group containing the Neotropical species *brasiliensis*, *zeteki*, *obscuricornis*, and *varicornis*. From the first it may be distinguished by the coloration of the fore wings and the shorter third antennal segment; from the next by the shorter head and shorter third antennal segment; from *obscuricornis* (hereby raised from varietal to full specific rank) by the much stouter fourth antennal segment; and from *varicornis* by the longer head, minute inner seta on the prothoracic epimeron, and the nearly black lateral abdominal setæ.

***Zeugmatothrips priesneri*, sp. nov.**

(Pl. IV, figs. 3-5.)

*Female* (macropterous).—Length about 2.4 mm. (fully distended, about 2.66 mm.). *Color* of head blackish brown, thorax and first two abdominal segments very much paler and yellowish brown in color, the prothorax shading to blackish brown in anterior angles and apices of the tubercles which bear the three pairs of lateral setæ, the pterothorax with all pleural plates blackish brown, the first abdominal segment with stigmatal plates blackish brown, sternum of second segment much darker than its tergum, abdominal segments III-X nearly or quite black; all coxæ brown, fore and hind femora white excepting the slightly brownish bases of the hind pair; middle femora white in about distal two-fifths and brown in remainder, basal portion and trochanters paler; fore tibiæ yellow, or brownish yellow, more or less clouded with brown, extreme bases white; middle and hind tibiæ white at base, brown beyond, distinctly yellowish at tip, the hind pair much darker; tarsi brownish yellow with black cups; antennæ about concolorous with head in segments I and II, the base of I and median distal portion of II paler, III with the very brief basal portion of pedicel yellowish and remainder of basal half dark brown, distal half yellow, IV-VII dark yellow, excepting the brownish distal fourth of VII, VIII dark gray-brown; wings pale yellowish brown, more or less darkened with gray along anterior margin, each with a yellowish brown median vein; internal (fat-body) pigmentation (evident in fresh or living material, especially if teneral; often not distinct in older specimens; usually distinct under reflected light) consisting of white and red, the former disposed as a thin, discontinuous layer just beneath the cuticula in the pale fore femora, in the pale apical portions of the middle and hind femora, in the dorsum of the metathorax, and at the sides of the second abdominal segment, the red pigmentation more sparse and disposed in head, thorax, sides of abdomen (excepting segment II) and bases of middle femora.

*Head* (Fig. 3) fully 1.5 times as long as greatest width, which is either across eyes or across cheeks just behind eyes, the cheeks narrowed at distal third, widened again behind middle, and narrowed again toward base; surface lightly but distinctly subreticulate, its reticles finely wrinkled; postocular setæ long (117  $\mu$ ) and knobbed, situated close to inner margins of eyes and on a line with their posterior margins, about 58  $\mu$  apart; *occipital setæ* similar in form, about 110  $\mu$  long, 42  $\mu$  apart, and about 37  $\mu$  from postoculars, both pairs arising from low tubercles; genal setæ disposed in two pairs, both very pale, slender, dilated at tip, and about 23  $\mu$  long. *Eyes*

Proc. Biological Soc. Washington.  
(the illustrated paper on THYSANOPTERA  
by Hoot) )



1



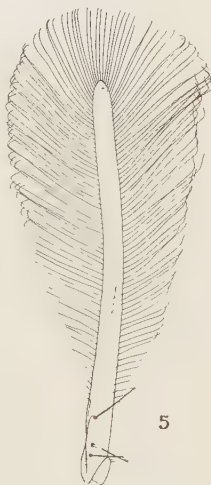
2



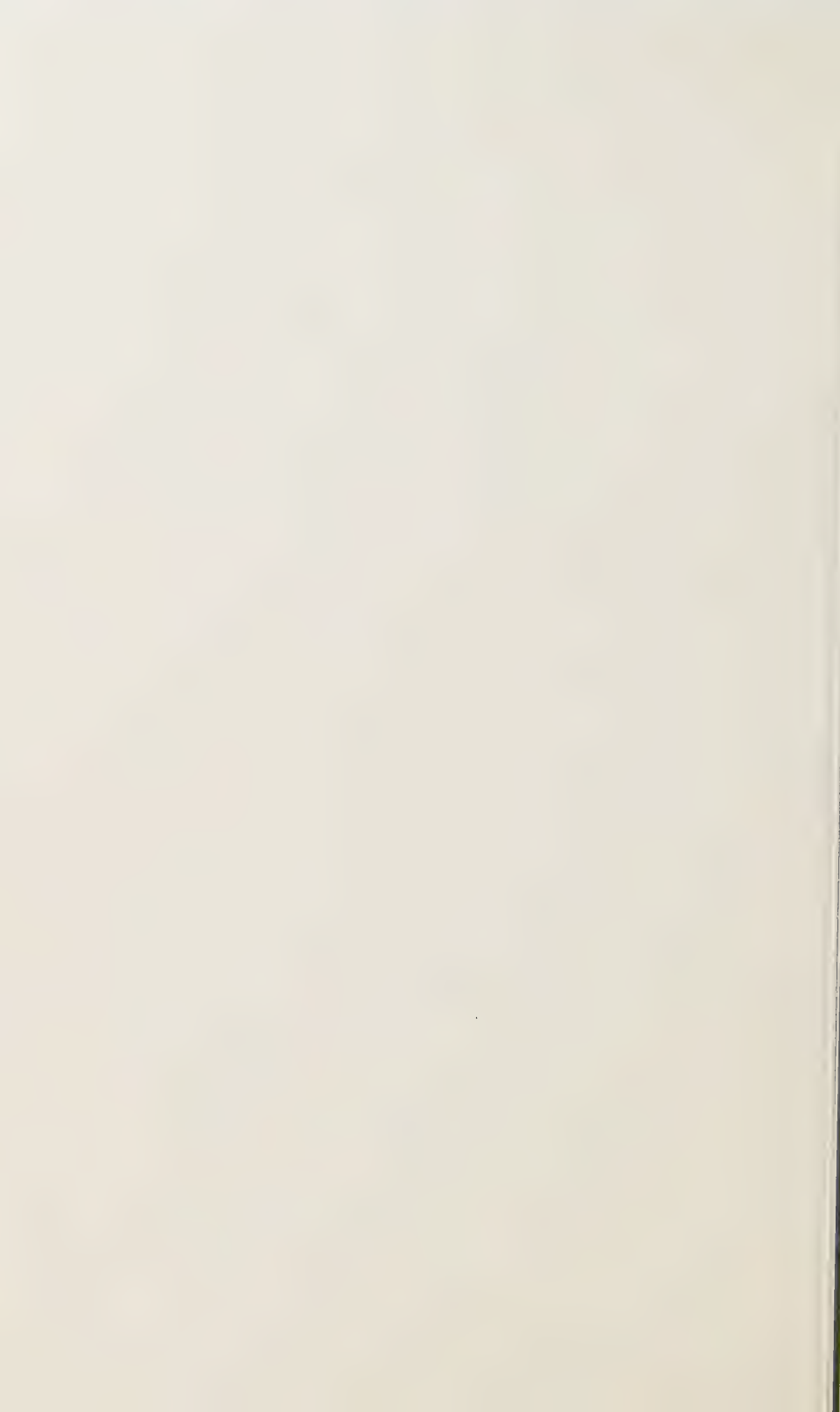
4



3



5



somewhat flattened, with three enlarged facets at outer posterior angles, their length less than one-third that of head, their width less than their interval. *Ocelli* equidistant, small, the posterior pair about  $17\ \mu$  in diameter and  $31\ \mu$  apart, the median one directed nearly forward and on a line with bases of antennæ. *Antennæ* (Fig. 4) about 2.1 times as long as head, their form and chaetotaxy well shown in figure; segment I with the long ( $117\ \mu$ ), knobbed seta arising from a distinct, subapical, dorsal tubercle; *III-V* each with a similar though slenderer dorsal seta arising from a prominent, dark base, that on *III* about  $87\ \mu$ , that on *IV* about  $80\ \mu$ , and the one on *V* about  $113\ \mu$  long. *Mouth-cone* broadly rounded, surpassing middle of prosternum.

*Prothorax* (Pl. IV, fig. 3) about 0.45 as long as head and (inclusive of coxae) about 2.5 times as wide as long, its surface with a few faint reticles, its five pairs of knobbed major setae borne on tubercles, its epimeron partially fused with pronotum; *anterior marginal setae* ( $105\ \mu$ ) *nearly as long as postoculars*, anterior laterals  $126\ \mu$ , midlaterals  $137\ \mu$ , epimerals  $130\ \mu$ , posterior marginals  $120\ \mu$  (in holotype). *Legs* normal to the genus; fore femora each with four strong, knobbed setae, middle and hind femora each with three, tibiae each with one; fore coxae without major setae; fore tarsi unarmed. *Wings* of both pairs long, narrow, of equal width throughout, and with a strong, median vein extending nearly to tip; fore pair (Pl. IV, fig. 5) with three subbasal setae about equal in length to anterior marginals and similarly knobbed, accessory setae of hind margin absent. *Mesothorax* much narrower than metathorax, the latter much swollen at sides; pronotum with a single pair of prominent, stout, knobbed setae,  $137\ \mu$  long in holotype, with their centers  $59\ \mu$  apart; metepimeron with a similar seta about equal in length to those on femora.

*Abdomen* broadest at segment III, where it is about 1.06 times the width of metathorax, thence tapering to tube; terga VI-IX rather heavily reticulate (this visible in teneral specimens or by reflected light); all tergal setæ long, heavy, and knobbed, the inner pair on II about 170  $\mu$ , middle pair on VII about 133  $\mu$ , dorsal pair on IX about 140  $\mu$ , longest terminal setæ on tube pointed, about 165  $\mu$ ; wing-retaining setæ sigmoid, pointed, one pair only on terga II-VII. *Tube* about 1.8 times as long as head, less than six times as long as greatest width, more than twice as broad near base as at apex, its surface with numerous clothing hairs, the longest of these equal to greatest width of tube; apex of tube slightly constricted.

*Measurements of ♀ (holotype), in mm.:* Length about 2.44 (partially distended, 2.63); head, length 0.297, width across eyes 0.195, greatest width across cheeks 0.193, least width (near base) 0.168; eyes, length 0.081, width 0.060; interval 0.075; prothorax, median length of pronotum 0.134, width inclusive of coxæ 0.336; metathorax, greatest width 0.419; abdomen, width at segment III 0.445; tube, length 0.548, width near base 0.097, width at apex 0.046.

|                         |           |    |    |     |     |    |    |    |
|-------------------------|-----------|----|----|-----|-----|----|----|----|
| Antennal segments:      | 1         | 2  | 3  | 4   | 5   | 6  | 7  | 8  |
| Length ( $\mu$ ):       | 53        | 57 | 90 | 104 | 110 | 77 | 62 | 70 |
| Width ( $\mu$ ):        | 46        | 35 | 30 | 31  | 32  | 29 | 26 | 18 |
| Total length of antenna | 0.623 mm. |    |    |     |     |    |    |    |



*Male* (macropterous).—Length about 2.0 mm. (partially distended, 2.2 mm.). Color and structure essentially as in female, the cephalic, antennal, and pronotal setæ as in that sex.

*Measurements* of ♂ (allotype), in mm.: Head, length 0.269, width across eyes 0.168, greatest width across cheeks 0.166, least width (near base) 0.146; eyes, length 0.077, width 0.051, interval 0.066; postocular setæ 0.110; occipital setæ 0.104; prothorax, median length of pronotum 0.117, width (inclusive of coxæ) 0.280; anterior marginal setæ 0.089, anterior laterals 0.103, midlaterals 0.116, epimerals 0.109, posterior marginals 0.110; metathorax, greatest width 0.342; abdomen, greatest width 0.346; tube, length 0.434, width near base 0.080, width at apex 0.042.

|                                |    |    |    |    |    |    |    |    |
|--------------------------------|----|----|----|----|----|----|----|----|
| Antennal segments:             | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Length ( $\mu$ ):              | 51 | 53 | 80 | 91 | 97 | 67 | 56 | 61 |
| Width ( $\mu$ ):               | 43 | 32 | 27 | 28 | 29 | 28 | 25 | 18 |
| Total length of antenna 0.556. |    |    |    |    |    |    |    |    |

*Larva, Instar I.*—Length about 1.3 mm. *Color* cream-yellow, with a bright crimson internal band along sides of pro-, meso-, and metathorax, this band extending across dorsum of first abdominal segment and continued forward along median line of metathorax; abdomen with a similarly colored band along sides of segments III–IX, successively broader (especially posteriorly) in III–V, in V involving the whole posterior dorsal portion of segment; legs, antennæ, and last two abdominal segments light gray, the antennæ with segment I paler and II somewhat darker than the others. *Head* with one pair of large, curved setæ, these about 90  $\mu$  in length, knobbed, dark in color, arising from low tubercles situated between eyes and close to their inner margins; antennæ with a tubercle on dorsum of segment III near apex from which arises a very long (207  $\mu$ ), dark, finely pointed seta that extends nearly to tip of antenna; segment III about 64  $\mu$  long, IV 52  $\mu$ ; mouth-cone long, heavy, semicircularly rounded at tip, and extending onto mesosternum. *Prothorax* with two pairs of long, dark, knobbed setæ, one of them stouter, situated near middle of dorsum, and 98  $\mu$  long, with its bases 43  $\mu$  apart and set in distinct tubercles, the more slender pair dorso-lateral in position, 152  $\mu$  apart, not set in tubercles, and 85  $\mu$  long; meso- and metathorax each with a transverse row of four tubercles from which arise knobbed setæ, of which the dorsal mesothoracic pair are 82  $\mu$  long and 59  $\mu$  apart, the lateral mesothoracic 127  $\mu$  long and 160  $\mu$  apart, the dorsal metathoracic 83  $\mu$  long and 61  $\mu$  apart, and the lateral metathoracic 141  $\mu$  long and 171  $\mu$  apart. *Abdomen* with a transverse row of four subequal, stout, knobbed setæ on dorsum of segments II–VIII, all arising from low tubercles, the lateral pair on VII about 72  $\mu$  long; lateral surfaces of II–VIII each with a slender, pointed seta; IX with a pair of dorsal, knobbed setæ (96  $\mu$ ) and two pairs of much shorter, pointed ones; segment X 97  $\mu$  long; XI with the two long setæ about 750  $\mu$  in length.

*Larva, Instar II.*—Length about 1.74 mm. *Color* almost as in first instar (the distribution of the crimson internal pigmentation nearly identical), but with the basal portions of antennal segments II–IV shaded with darker and abdominal segments IX and X largely dark blackish brown, IX shading

to nearly colorless in basal portion, X shading to brown in distal half. *Head* with its single pair of large setæ situated between eyes, dark brown, curved, knobbed, about 130  $\mu$  long, and arising from distinct tubercles; antennæ with the long seta on segment III about 166  $\mu$  long; segment III somewhat flared at base, 116  $\mu$  long; IV 77  $\mu$ ; V 60  $\mu$ , with a swelling on inner surface near base and decidedly narrowed just beyond; VI 103  $\mu$ . *Prothorax* with four pairs of strong, knobbed, brownish setæ arising from tubercles, the two pairs on anterior margin 92–98  $\mu$ , the midlateral pair 120  $\mu$ , the pair near posterior angles 90  $\mu$ ; dorsal mesothoracic setæ 104  $\mu$ , interval 71  $\mu$ ; lateral mesothoracic 141  $\mu$ , interval 237  $\mu$ ; dorsal metathoracic 120  $\mu$ , interval 78  $\mu$ ; lateral metathoracic 146  $\mu$ , interval 225  $\mu$ . *Abdomen* with a pair of dorsal setæ (77  $\mu$ ) on I, and three pairs on II–VIII, all knobbed and arising from tubercles, the lateral pair on VII 80  $\mu$ , dorsals on IX 144  $\mu$ , laterals on IX pointed, 172  $\mu$ ; median length of segment X 210  $\mu$ ; XI with the two long setæ about 574  $\mu$  in length.

The 53 females, 11 males, and 2 larvæ which form the type series of this species represent only a small proportion of the total number of specimens taken in Panama during the summer and fall of 1933. The insect feeds upon fungus spores, and is thus to be encountered in a variety of habitats—among dead, decomposing leaves suspended in trees and bushes or fallen upon the ground, on dead branches, and in dead, cut grass. The types bear the following additional data:

Barro Colorado Island, C. Z., Panama, June 26 (*holotype* and *allotype*) to October, 1933, J. D. Hood, Sabra J. Hook, Helen H. Hood, Cristobal Marquinez, and Silvestre Aviles [Hood Nos. 948, 949, 954, 956, 959, 971, 983, 997, 998, 1007, 1019, 1024, 1039, 1050, 1075].

Frijoles, C. Z., Panama, June 30, 1933, J. D. H. [Hood No. 965].

Porto Bello, Panama, July 8–10, 1933, J. D. H. [Hood Nos. 984, 987–989].

From the other species of the genus, namely, *hispidus* and *hoodi*, this may be known at once by the four large setæ behind the eyes, the large setæ on the third and fourth antennal segments, and the large anterior marginal setæ on the pronotum. The Mexican *hispidus*, though possessing the large antennal setæ of *priesneri*, has the posterior pair of cephalic setæ and the anterior marginal setæ both reduced in size; while the Costa Rican *hoodi*, though like the present species in the latter two respects, is devoid of the prominent antennal setæ on segments three and four.

Dr. H. Priesner has kindly loaned me for study one of the two known specimens of his Costa Rican species, without which the differentiation of the present one would not have been possible.

*Zeugmatothrips* and *Zeugmatothripoides* both belong in the Compsothripini, in the close neighborhood of *Actinothrips*, rather than where they are now placed in the Hystricothripini.

EXPLANATION OF PLATE.

Drawn by Mrs. Philip T. Bassett (Helen E. Rearwin); camera lucida.

Fig. 1.—*Tæniothrips silvestris*, sp. nov., head and prothorax, ♀, paratype; setæ omitted from appendages.

Fig. 2.—*Tæniothrips silvestris*, right antenna, ♀, paratype.

Fig. 3.—*Zeugmatothrips priesneri*, sp. nov., head and prothorax, ♀, paratype.

Fig. 4.—*Zeugmatothrips priesneri*, right antenna, ♀, paratype.

Fig. 5.—*Zeugmatothrips priesneri*, right fore wing, ♀, paratype.

PROCEEDINGS  
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A FLORIDA SUBSPECIES OF *PSEUDACRIS NIGRITA*  
(HYLIDAE).

BY MAURICE K. BRADY AND FRANCIS HARPER.

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*Chorophilus verrucosus*, described by Cope (1877, p. 87) on the basis of a single specimen from Volusia,<sup>1</sup> Volusia County, Fla., and later reduced by the same author (1889, p. 459) to subspecific rank as *Chorophilus nigrinus verrucosus*, has long remained in oblivion. No author during the past 45 years seems to have accorded it recognition.

The type, said by Cope (1889, p. 459) to have been in his private collection, has just been located among the unidentified material in the collection of the Academy of Natural Sciences of Philadelphia (No. 10773). Its label is not the original one; it bears, besides the name of the Academy and the catalogue number, only the following information: "Cope Collection. Type. Volusia, Florida." In the same jar was an immature *Rana* (No. 10772), likewise labeled as "type" and without a name. Both specimens had been entered in the Academy's bound catalogue under an incomplete generic name and an apparently unpublished specific name bearing no resemblance to *verrucosus*. The two specimens are entirely unlike in size, color, and structure, and the lumping of them together in the catalogue was due to some clerical error.

The type of *verrucosus* is now somewhat shrunken and discolored, but still answers satisfactorily to the original description, which reads, in part, as follows: "Color above leaden, with three longitudinal rows of darker, light edged spots . . . Upper lip dark plumbeous, with a series of five white spots." Cope stressed the tubercular upper surface and the coloration as distinguishing this frog from *C. triseriatus* (Wied). The dorsal and maxillary spots are still distinct.

Some of the original measurements and the present corresponding measurements of the type are, respectively: length, 19, 18 mm.; tibia, 8, 8.5; tarsus, 5, 5; width of head at tympana, 5.5, 5. The whole hind foot

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<sup>1</sup> This place, which does not appear on recent maps, was on the east side of the St. John's River, perhaps 5 miles southeast of Lake George.

now measures 12.5. Cope is clearly in error in stating (1889, p. 338) that *verrucosus* differs from *C. nigrinus* (Le Conte) in the somewhat longer tarsus, and from *C. feriarum* (Baird) in the longer hind leg. He records the tarsus of *nigrinus* as 9.4 mm., and the "hind leg" of *feriarum* as 1.77 in. (=45 mm.), as compared with a "hind limb" of 26 mm. in *verrucosus*. The type of *verrucosus* is unquestionably immature.

Before the type was located, examination of a series of 20 Florida specimens in the U. S. National Museum had convinced us of the need of resurrecting this frog under the name of *Pseudacris nigrita verrucosa* (Cope). These specimens are the following: Nos. 85403-85407 and 95797, collected at Paradise Key, Dade County, by M. K. Brady, Jan. 21, 1932; Nos. 85408-85417, collected at Pompano, Broward County, by M. K. Brady, Feb. 22, 1932; Nos. 82576-82579, collected at Sanford, Seminole County, by D. Stoner.

In comparison with two males from Charlton County, Ga. (F. H., Nos. 180-181<sup>2</sup>), which are probably typical of *P. n. nigrita*, the Florida specimens are distinguished by having the light maxillary stripe broken up and reduced to a few small spots or to a few thin, wavy, oblique or transverse streaks. In one or two specimens it is difficult to discover any vestige of the maxillary stripe. In other forms of the *nigrita* group this stripe is such a distinct and apparently constant character that its obliteration to a large extent in *verrucosa* may be regarded as of considerable taxonomic significance. The arrangement of the dorsal spots is similar to that in *P. n. nigrita*, but the spots apparently tend to be slightly smaller and better separated. The light bars on the hind limbs seem to be generally a little broader than in Georgia specimens. The under parts in general are unspotted, but a few specimens exhibit dark punctulations between the pectoral areolae or along the mandible. Cope states (1877, p. 87) concerning the immature type of *verrucosa* that "The skin of the gular and sternal region is smooth; of the abdomen, areolate." However, areolae are evident on the throat as well as on the breast of the present adults of both sexes. In males of *verrucosa* the throat is yellowish in life and generally clear or unspotted in spirits, whereas in males of *nigrita* the throat is dusky orange in life and dusky in spirits.

The average measurements of seven males (3 from Paradise Key, 4 from Pompano) and the measurements of a single female of *verrucosa* (from Paradise Key) are, respectively, as follows: length, 24.9, 30; tibia, 12.7, 15.5; whole hind foot, 19.5, 25.5; intertympanic width, 6.5, 7.5; elbow to tip of third finger, 10.9, 13; interolecranal extent (distance between elbows when humeri are extended in the same line at right angles to longitudinal axis of body), 15.9, 19; intergenual extent (distance between knees when femora are extended in the same line at right angles to longitudinal axis of body), 22.1, 26. A male of *P. n. nigrita* from Charlton County, Ga. (F. H., No. 180), is slightly larger in every dimension than the maximum for the males of *verrucosa*: length, 29.5; tibia, 14; whole hind foot, 23; intertympanic width, 7.5; elbow to tip of third finger, 12.5; interolecranal extent, 18.5; intergenual extent, 25.

<sup>2</sup> No. 180 is figured in Nat. Geog. Mag., vol. 65, no. 5, p. 602, 1934.



*P. n. verrucosa* (for which we suggest the common name of "Florida Chorus Frog") probably ranges over most or all of peninsular Florida south of the fairly well-marked boundary between the Louisianian and the Floridian Faunas (cf. Howell, 1932, pl. 8). This boundary passes near St. Marks, Gainesville, and Jacksonville.

During the evening of February 13, 1917, Harper heard about two of these frogs trilling in the northern part of the "Apopka Saw-grass," in Lake County.

The following field notes are by Brady. "During the night of January 20, 1932, R. F. Deckert and I were collecting in the Royal Palm Hammock, on Paradise Key. In this tropical setting we were surprised to hear the trilling of *Pseudacris* coming from the 'glade' on the west side of the hammock. The call, though possibly a little higher in pitch, was remarkably similar to that of *P. n. feriarum* as heard in the vicinity of Washington, D. C. The chorus was very small and localized. After considerable difficulty we managed to approach the position of the calls and found them coming from depressions and 'potholes' among the limestone rocks and 'glade' vegetation. These depressions contained shallow ponds that were choked with *Isnardia*. Once we had gotten into their immediate vicinity, the frogs became silent, but by running a finger along the teeth of a pocket comb, we were able to imitate the voice sufficiently to induce them to call again. We thus located the males, which occupied well-separated stations and were sitting on projections of the limestone above the water line of the little ponds. The skin of these frogs appeared to be very granular. The dorsal ground color was a metallic gray-green, with the spots showing distinctly at night. When exposed to daylight, the frogs became very much darker.

"In addition to a series of six calling males, we took a pair in amplexus. The female deposited 160 eggs, a few separately, but the majority in a loose mass not differing from the egg mass of *feriarum*. The brown and white eggs resembled those of *feriarum*, but seemed somewhat smaller, the vitellus measuring less than .5 mm. The single envelope measured 1.5-2 mm. Development was very rapid and hatching took place within 60 hours.

"A month later we encountered another *Pseudacris* chorus a few miles west of Pompano, in Broward County. The voice seemed identical with that of our first chorus but the frogs were found under different conditions, in shallow ditches and in depressions in open fields. Several other frogs, including *Pseudacris ocularis* (Holbrook), were singing at the same time."

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PROCEEDINGS  
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NEW BIRDS FROM NORTHWESTERN MEXICO.

BY ROBERT T. MOORE,  
*California Institute of Technology.*

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Prosecution of studies of rapidly accumulating collections from Sinaloa for the California Institute of Technology has revealed several new races, two of which I am describing in this paper. It had been planned to publish the descriptions in the contemplated report on the birds of Sinaloa, but as its publication will be delayed to permit the inclusion of a mass of new material, it seems wise to follow the advice of fellow-workers to release these descriptions currently in order that the findings may be available to taxonomists prosecuting work in adjacent areas.

For permission to examine specimens in their collections, my acknowledgments are gratefully offered to Dr. Alexander Wetmore and Dr. Herbert Friedmann of the Smithsonian Institution, Mr. John T. Zimmer of the American Museum of Natural History and Mr. James L. Peters of the Museum of Comparative Zoölogy.

On May 4, 1934, the author started with pack animals and assistants from the Guirocoba Ranch near Alamos in southeastern Sonora on a zoölogical reconnaissance, crossed the junction of the Rio Chinipas and the Rio Fuerte on May 6th, and began the long four-day ascent of the western face of the Mexican tableland. On May 11th to 13th a region of canyons was crossed, where powerful streams are flanked by massive oaks and cedars, and humid conditions have draped rock and tree with moss. Continuing eastward, the brink of the vast canyon of the Barranca del Cobre was reached on May 15th. As dry as the Arroyo Hondo is humid, this great canyon system, somewhat recalling in proportions the Grand Canyon of the Colorado, conveys the waters of the Uriqui River to their ultimate juncture with the Rio Fuerte and on to the Pacific Ocean on the west coast of Mexico. The latter, arid throughout its course across northern Sinaloa, passes through cactus country, and was followed by our party from Choix westward nearly to the coast, a few weeks later. Although a stretch

of about twenty-five miles of this river course (from Choix, Sinaloa, to Churo, Chihuahua) was not observed by us, there is little doubt that arid conditions are nearly continuous throughout its length and that this river provides a migration route, which birds, preferring arid conditions, follow from Chihuahua into northern Sinaloa. The relation of this arid river system to the region of humid canyons to the west and north, on the face of the Mexican plateau, will be discussed in a later paper. Enough has been said to indicate why several resident species, such as *Ptilogonys* described below, are humid area birds, whereas others confine themselves to dry conditions.

***Ptilogonys cinereus otofuscus*, subsp. nov.**

CHIHUAHUA PTILOGONYS.

*Type*.—Male adult; No. 9220, collection of Robert T. Moore; Arroyo Hondo, Chihuahua, Mexico (about thirty miles northeast of junction of Rio Chinipas and Rio Fuerte in southwestern Chihuahua); May 27, 1934; collected by Robert T. Moore.

*Subspecific characters*.—Nearest to *Ptilogonys cinereus molybdophanes* Ridgway of Guatemala, but color above lighter; gray of under parts not extending so far on the abdomen; rump somewhat lighter than back instead of being uniform with it; auricular region with a tendency to be darker.

This Chihuahua race differs more distinctly from the forms which lie geographically near to it, such as *Ptilogonys cinereus pallescens* Griscom of Guerrero, *Ptilogonys cinereus cinereus* Swainson from Temascaltepec and a series from Jalapa in Vera Cruz, than it does from *molybdophanes*. Males of *otofuscus* differ from a series of *cinereus*, recently collected for the Institute by W. W. Brown at Temascaltepec, in that the males are much darker bluish-gray above with no cast of brown; top of head bluish-gray rather than brownish-gray; auricular region much darker (Fuscous<sup>1</sup> to Fuscous-Black instead of Clove Brown); chin and throat whiter; lower throat and breast darker blue-gray without brownish tinge; flanks darker olive green. Females of *otofuscus* have rump and upper tail-coverts much lighter (grayer); back grayer and more uniform with crown; lower throat and breast darker brown. Compared with *cinereus pallescens* Griscom of Guerrero, the new race is distinctly darker on back and lower throat in males and much darker brown on lower throat and breast in females.

*Range*.—The series, which I collected in the Arroyo Hondo, seem to constitute the only record for Chihuahua. Frazar seems to have missed it on his ascent from Alamos to Pinos Altos, which took him only 25 miles north of the Arroyo Hondo. No *Ptilogonys* were reported by W. De W. Miller from southern Sinaloa or northwestern Durango. Godman, in the *Biologia Centrali Americana*, states that its northernmost recorded localities are Guanajuato and the Sierra Madre near Colima, but Ridgway records it from El Salto in southern Durango. It does not seem likely that a gap of several hundred miles occurs in the range; further collecting may be

<sup>1</sup> Capitalized names of colors in paper are taken from Ridgway, *Color Standards and Color Nomenclature*, 1912.

expected to reveal this bird in the intervening area, although our collectors have not secured a specimen during two years of work in the mountains of northeastern and southeastern Sinaloa.

*Specimens examined*.—Temascaltepec (*cinereus cinereus*) 9; Jalapa, Vera Cruz (*cinereus*) 9; Jalisco and Tepic (intergrades between *cinereus* and *pallascens*) 17; Guerrero (*pallascens*) 13; Guatemala (*molybdophanes*) long series in Mus. Comp. Zool.; Chihuahua (*otofuscus*) 9.

*Remarks*.—The Type of *Ptilogonys cinereus* Swainson is given as the "table lands of Mexico." It is quite probable that my fresh specimens from Temascaltepec (an old type locality of Swainson) are topotypical and I suggest that the "table lands of Mexico" of the original description be restricted to Temascaltepec. These specimens, taken chiefly in the middle of June, are comparable in plumage with my series from Chihuahua, all secured May 27th, and with May specimens of *pallascens* from Guerrero. The birds from Vera Cruz were collected in March and April and their darker color may be due to this earlier date. Care must be taken to contrast similar plumages, but there is adequate material to do this. It is rather unusual that the two light forms, namely, *pallascens* of Guerrero and *cinereus cinereus* of the central Mexican plateau are found geographically between the darkest form, *molybdophanes* of Guatemala, and the almost equally dark race, *otofuscus* of Chihuahua. This would be inexplicable, if the new form were a bird of the arid region of northwestern Mexico. On the contrary it seems to be confined to the humid canyons which dissect the western face of the Mexican plateau. Like its congeners to the south, it ranges from 5000 to 7000 feet in altitude on the canyon walls foraging for berries of the orange-barked Mandrono tree. It was not found in the arid Baranca del Cobre, not 25 miles away, where this tree was lacking.

***Phloeocastes guatemalensis dorsofasciatus*, subsp. nov.**

SONORA IVORY-BILL.

*Type*.—Male adult, No. 5430, collection of Robert T. Moore; Guirocoba, Sonora, Mexico; Feb. 7, 1932; collected by J. T. Wright.

*Subspecific characters*.—Similar to *Phloeocastes guatemalensis regius* (Reichenbach) of Eastern Mexico, but somewhat smaller; lower throat and breast darker, the black more intense and glossy, the light bars darker and nearer Clay Color, the light bars of the lower half of the under parts whiter; under side of outer rectrices not concolor but Deep Olive-Buff along shaft, Olive-Brown on outer half. Females have black plumes longer than the red ones.

NOTES ON CHARACTERS.

The new race seems to differ from all other races of *guatemalensis*, in having the middle of the lower back barred black and white, particularly in the males, and the bars of abdomen averaging more numerous. Perhaps the most important difference is found in the females. The black plumes of adult birds in every one of the 9 females from Sonora and northern



Sinaloa are longer than the red plumes, averaging 6.3 mm. longer, whereas in all southern races the black plumes average shorter than the red and in *nelsoni* of the west coast and the forms from the east coast they are equal. Comparing males with the geographically adjacent race of *nelsoni* of Guerrero, we find the new race differs more markedly from it, being distinctly larger and darker, the back stripes and the light bars below decidedly more buffy, as compared with the almost pure white of *nelsoni*. The birds of the mountains of southern Sinaloa are intergrades between *dorsofasciatus* and *guatemalensis* of southern Mexico and Guatemala.

*Range*.—Alamos district of southern Sonora and the foothills and mountains of Sinaloa to an altitude of at least 6000 feet. The new race reaches sea-level in southwestern Sinaloa, 3 of our 33 specimens coming from Quelite and Rosario and 3 more from an altitude of 1000 feet on the Rio Las Canas in northwestern Nayarit.

*Specimens examined*.—Sonora, Sinaloa and Nayarit (*dorsofasciatus*) 50; Guerrero, Michoacan, Colima and Tepic (*nelsoni*) 18; Jalisco, Oaxaca, Quintana Roo (intergrades) 6; Honduras, Guatemala, San Salvador (*guatemalensis*) 22; Panama, Costa Rica (*buxans* of Bangs) 23; Vera Cruz, City of Mexico (*regius*) 13; Tamaulipas, "Tolosa" (*regius* ?) 23; total 155.

*Remarks*.—The differentiation of the races of *Phloeocastes* has been marked by the misfortune, common to so many species of Mexican birds, in that the regions of intergrades were searched most diligently, whereas the habitat of the races on the periphery was not combed until a later date. As a result, the first form to be described—*guatemalensis guatemalensis*—is probably an intergrade and on the other hand one of the most distinct forms, the bird of Tamaulipas, may have to remain nameless, due to the fact that *C[ampephilus] regius* Reichenbach was described from a specimen obtained at Papantla, central Vera Cruz, half way between the center of distribution of the Tamaulipas form and the smaller bird of southern Vera Cruz. The author has in manuscript a review of the races of *Phloeocastes*, so that nothing further will be said here, except that as in other Mexican mountain forms, which tend to spill over to sea-level on either side of the Mexican plateau, the southcentral Mexican region seems to be a great melting pot, where the characters of the races to the north and south are jumbled together in a puzzling way. Based on critical examination of many forms, it is indicated that the birds of the mountain areas of southeastern Sonora, southwestern Chihuahua and eastern Sinaloa have closer affinities with the mountain forms of central and eastern Mexico, than with the geographically nearer coastal forms of western Mexico.

The three birds from the Sinaloa coastal plain area, Quelite to Rosario, taken from Jan. 3d to Feb. 10th in unworn plumage, are decidedly browner (Rusty Brown) on primaries, tail and lower back than the rest of the specimens from the mountains, taken in exactly the same stage of moult and period of the year. One specimen from the Rio Las Canas, Nayarit, resembles them somewhat. It would seem that the intense sun of the dry coastal plains has burned and browned the exposed portions of the feathers. Whether these are racial characters, developing in arid conditions, can not be determined without more adequate material.

PROCEEDINGS  
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NATURAL HISTORY OF PLUMMERS ISLAND,  
MARYLAND.

I. INTRODUCTION.

BY WILLIAM R. MAXON.

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The Washington Biologists' Field Club was founded early in 1900 with the primary object of forwarding the study of the natural history of the District of Columbia and vicinity. In June of the following year, having incorporated in the meantime and having increased somewhat its small membership, the Club took out a five-year lease of Plummers Island, lying in the Potomac River near the Maryland shore, about ten miles above Washington, and erected here a small camp. Subsequently (1908), by grant of original patent and the purchase of quitclaim, it acquired title to the Island and about 35 acres of land upon the adjacent Maryland shore. The latter stretch, known to members commonly as "the mainland," has since been increased by purchase to nearly 40 acres. The Island itself, separated from the Maryland shore by a narrow channel which varies considerably according to season, is in the form of an elongate triangle pointing downstream, eastward. It comprises about 15 acres, and is quite as diverse in terrain as the shore property.

This entire territory of more than 50 acres has been the subject of intensive study since 1901, and has proved of exceptional interest. A great mass of biological data of many sorts, including life history studies, migration records, and the description of scores of new forms, has been accumulated; and although the most painstaking investigation of any area, however small, can in the nature of things never be complete, it has nevertheless seemed desirable to offer for publication,





group by group, briefly annotated lists of the species thus far observed or collected in this restricted locality. These, it is thought, will be helpful to local naturalists for the information they afford, and stimulating because of their very lacunae. Species omitted or overlooked, or recorded doubtfully in these lists, will become real desiderata not only to present but future collectors.

The general features of the Potomac gorge above Washington are well known and have been described by Ward,<sup>1</sup> M. Atee,<sup>2</sup> and others. Plummers Island and its vicinity are fairly typical of this region. The Island is rocky nearly throughout, with several high precipitous cliffs, its margins consisting of a flood-plain of varying extent which naturally is greatest at the low, pointed, downstream end. It is mostly covered by trees in mixed association, and supports a luxuriant growth of undershrubs, ferns, and herbaceous flowering plants. The highest part is the knoll where the cabin stands, 125 feet above sea level and about 75 feet above mean low-water mark. Halfway toward the western end of the island is a similar hill, 25 feet lower, which is precipitous to the west. The "mainland" shore territory, extending westward along the old Chesapeake and Ohio Canal from Lock 10 to Lock 12 and southward to the river, includes among other features a field of several acres, formerly under cultivation but now growing up rapidly to young pines, the small deep ravine of Rock Run, a swampy area near Lock 12, and three shallow woodland pools (between the swamp and the ferry), which are more or less permanent. A few necessary trails have been cut, but otherwise the whole 55 acres of Island and "mainland" has consistently been left in its original condition.

The field work has been done mostly by club members, nearly all chosen from the scientific personnel of the Smithsonian Institution, Geological Survey, Department of Agriculture, and District of Columbia High Schools. Only two or three formal lists of species in any group have hitherto been published, although a very large number of papers dealing incidentally with the biology of Plummers Island and its immediate vicinity

<sup>1</sup>*Guide to the Flora of Washington and Vicinity.* (Bull. U. S. Nat. Mus. 26. Pp. 1-264, with map. 1881.)

<sup>2</sup>*Sketch of the Natural History of the District of Columbia.* (Bull. Biol. Soc. Washington. Pp. 1-142. 1908.)



have appeared. Careful card-catalogue records have been kept, however, and these are mainly substantiated by specimens, so that in most groups the preparation of lists will not offer great difficulty. The specimens collected are in large part preserved in the National Museum or, in the case of the ferns and flowering plants, at the clubhouse. The preservation of specimens is especially important because of the various changes that necessarily have taken place in the Island during the past 35 years and will continue from natural and other causes. With alteration of habitat conditions certain species have disappeared and others have come in, an excellent example of the latter being the numerous aquatic and shore plants recorded by Killip\* for the low-water summer season of 1930. Besides topographic changes, there has been in recent years a considerable modification in the tree-covering of the Island, mainly from drought, with consequent letting-in of sunlight, which already is bringing about changes in the herbaceous vegetation. Similar variation is noted in the insect fauna; but fallen timber has mostly been allowed to remain in place, and in other ways natural conditions have been preserved in so far as possible. Members of the Club have never numbered more than 50 at one time. They, with many distinguished visiting biologists who have collected upon the Island, have given it an almost unique place in current natural history studies.

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\*Proc. Biol. Soc. Washington 44: 111-116. 1931.





## II. FLOWERING PLANTS AND FERNS.

BY E. P. KILLIP AND S. F. BLAKE.

This list of flowering plants and ferns of Plummers Island and vicinity includes 720 species and 9 additional varieties, of which 648 species are known from Plummers Island and 72 only from the adjacent mainland property. Species known only from the mainland are marked with an asterisk; those included on the strength of satisfactory records, but of which no specimen is preserved, with a dagger (of these, 32 are recorded from the Island and 11 from the mainland only). All names not marked with a dagger are represented by preserved specimens. In general, annotations have been confined to the species believed to be extinct, rare, or sporadic; probably not all the species actually rare have been so indicated. For convenience, the nomenclature of the "Flora of the District of Columbia and vicinity" by A. S. Hitchcock and Paul C. Standley has been followed throughout, except for the use of nomina conservanda in this list and for the few cases where the name used in that Flora was incorrect.

The following species, all (except *Quercus macrocarpa* and *Hydrastis canadensis*) known to be native in the District of Columbia region but not in the Plummers Island area, have been transplanted to the Island or to the mainland, where most have thrived although a few have died out: *Pellaea atropurpurea*, *Polypodium polypodioides*, *Lygodium palmatum*, *Pinus pungens*, *Pinus taeda*, *Teuga canadensis*, *Veratrum viride*, *Iris cristata*, *Comptonia peregrina*, *Quercus macrocarpa*, *Hydrastis canadensis*, *Prunus virginiana*, *Gaultheria procumbens*, *Rhododendron maximum*, *Dodecatheon meadia*, *Spigelia marylandica*, *Lonicera sempervirens*, *Viburnum nudum*.

## OPHIOGLOSSACEAE. ADDERTONGUE FAMILY.

*Botrychium virginianum* (L.) Swartz. Rattlesnake fern.

## POLYPODIACEAE. FERN FAMILY.

*Adiantum pedatum* L. Maidenhair fern.

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- × *Asplenium ebenoides* R. R. Scott. In rock crevice, Plummers Island,  
April 23, 1899, William Palmer.  
*platyneuron* (L.) Oakes. Ebony spleenwort.  
*trichomanes* L. Maidenhair spleenwort. Rare.  
*Camptosorus rhizophyllus* (L.) Link. Walking fern. Rare.  
*Cystopteris fragilis* (L.) Bernh. (*Filix fragilis*.) Brittle fern.  
*Dennstaedtia punctilobula* (Michx.) Moore. Hay-scented fern.  
*Dryopteris marginalis* (L.) A. Gray. Marginal shield-fern.  
\* *Onoclea sensibilis* L. Sensitive fern.  
*Polypodium vulgare* L. Polypody.  
*Polystichum acrostichoides* (Michx.) Schott. Christmas fern.  
*Pteris nodulosa* (Michx.) Nieuwl. Ostrich fern.  
*Woodsia obtusa* (Spreng.) Torr.

EQUISETACEAE. HORSETAIL FAMILY.

- Equisetum arvense* L. Horsetail.

SELAGINELLACEAE. SELAGINELLA FAMILY.

- \* *Selaginella apoda* (L.) Fernald. Rare.

PINACEAE. PINE FAMILY

- Juniperus virginiana* L. Redcedar.  
\* † *Pinus echinata* Mill. Yellow pine.  
*virginiana* L. Scrub pine.

TYPHACEAE. CATTAIL FAMILY.

- † *Typha latifolia* L. Cattail. Extinct.

POTAMOGETONACEAE. PONDWEED FAMILY.

- Potamogeton crispus* L. Pondweed. Sporadic.  
*foliosus* Raf.

NAJADACEAE.

- Najas guadalupensis* (Spreng.) Morong. (*N. flexilis*, at least in part, of  
D. C. Flora.)

ALISMACEAE. WATERPLANTAIN FAMILY.

- Alisma subcordatum* Raf. Waterplantain. Sporadic.  
*Lophotocarpus calycinus* (Engelm.) J. G. Smith. Sporadic.  
*Sagittaria latifolia* Willd. Arrowhead.  
*pubescens* Muhl.  
*rigida* Pursh. Sporadic.

VALLISNERIACEAE. WILDCELEERY FAMILY.

- Elodea occidentalis* (Pursh) St. John. (*Anacharis canadensis*.) Water-  
weed.  
*Vallisneria americana* Michx. (*V. spiralis*.) Wildcelery. Rare.

POACEAE. GRASS FAMILY.

- Agrostis alba* L. (*A. palustris*.) Redtop.  
*perennans* (Walt.) Tuckerm.  
*Andropogon furcatus* Muhl.  
*tescoparius* Michx.  
*virginicus* L. Broom-sedge.  
† *Anthoxanthum odoratum* L. Sweet vernal grass.  
*Brachyelytrum erectum* (Schreb.) Beauv.  
*Bromus purgans* L.  
*Cinna arundinacea* L. Wood reed-grass.  
† *Cynodon dactylon* (L.) Pers. (*Capriola dactylon*.) Bermuda grass.  
† *Dactylis glomerata* L. Orchard grass.  
*Danthonia spicata* (L.) Beauv.  
*Digitaria ischaemum* (Schreb.) Muhl. (*Syntherisma ischaemum*.)  
*sanguinalis* (L.) Scop. (*S. sanguinalis*.) Crabgrass.  
*Echinochloa crusgalli* (L.) Beauv. Barnyard grass.  
*Eleusine indica* (L.) Gaertn. Goose grass.







- \**Elymus australis* Scribn. & Ball. Wild rye.  
*glabriflorus* (Vasey) Scribn. & Ball.  
*villosus* Muhl. (*E. striatus*)  
*virginicus* L.  
     var. *hirsutiglumis* (Scribn.) Hitchc.  
*Eragrostis capillaris* (L.) Nees.  
*frankii* (Fisch., Mey. & Lall.) Steud.  
*hypnoides* (Lam.) B.S.P.  
*spectabilis* (Michx.) Steud. (*E. pectinacea*.)  
*Festuca obtusa* Spreng.  
*Glyceria striata* (Lam.) Hitchc. (*Panicularia nervata*.)  
*Hystrix patula* Moench.  
*Leersia oryzoides* (L.) Swartz. (*Homalocenchrus oryzoides*.)  
*virginica* Willd. (*H. virginicus*.)  
*Melica nutica* Walt.  
*Muhlenbergia mexicana* (L.) Trin.  
*schreberi* J. F. Gmel.  
*Panicum anceps* Michx.  
     *ashei* Pearson.  
     *barbulatum* Michx.  
     *bicknellii* Nash.  
     *boscii* Poir.  
     \*var. *molle* (Vasey) Hitchc. & Chase.  
     *capillare* L.  
     *clandestinum* L.  
     *commutatum* Schult.  
     *depauperatum* Muhl.  
     *dichotomiflorum* Michx.  
     *dichotomum* L.  
     *gatlingeri* Nash.  
     *huachucae* var. *fasciculatum* (Torr.) Hubb. (var. *silvicola*.)  
     *linearifolium* Scribn.  
 \**microcarpon* Muhl.  
     *philadelphicum* Bernh.  
     *tennesseense* Ashe.  
     *virgatum* L.  
     *zalapense* H.B.K.  
     *yadkinense* Ashe.  
*Paspalum repens* Bergius.  
*Phalaris arundinacea* L. Reed canary grass.  
*Poa cuspidata* Nutt. (*P. brachyphylla*.)  
     *compressa* L. Canada bluegrass.  
     *pratensis* L. Kentucky bluegrass.  
     *sylvestris* A. Gray.  
     *trivialis* L.  
*Setaria lutescens* (Weigel) Hubbard. (*Chasclachloa lutescens*.) Yellow  
     foxtail.  
     *viridis* (L.) Beauv. (*C. viridis*.) Green foxtail.  
*Sorghastrum nutans* (L.) Nash. Indian grass.  
 \**Sphenopholis intermedia* Rydb. (*S. pallens*.)  
     *nitida* (Spreng.) Scribn.  
*Sporobolus vaginæiflorus* (Torr.) Wood.  
*Stipa avenacea* L.  
*Tridens flava* (L.) Hitchc. (*Tridens flavus*.) Purpletop.  
*Tripsacum dactyloides* L. Gama grass.  
*Uniola latifolia* Michx.

CYPERACEAE. SEDGE FAMILY.

*Carex albursina* Sheldon.

*amphibola* Steud.

*artilecta* Mackenzie (*C. varia*.)

*asa-grayi* Bailey. Rare; collected May 29, 1933, Killip; first record for District of Columbia region.

*blanda* Dewey

*cephalophora* Muhl.

*comosa* Boott.

*complanata* Torr.

*convoluta* Mackenzie.

*crinita* Lam.

*frankii* Kunth.

\**gracillima* Schwein.

*grisea* Wahlenb.

*hirsutella* Mackenzie. Rare.

*hirtiflora* Mackenzie. Rare.

*hitchcockiana* Dewey.

\**incomperta* Bicknell.

*jamesii* Schwein.

*laxiflora* Lam.

*leavenworthii* Dewey.

\**lupulina* Muhl.

\**lurida* Wahlenb.

*nigro-marginata* Schwein.

*normalis* Mackenzie.

*oligocarpa* Schkuhr.

*pennsylvanica* Lam.

*plana* Mackenzie.

*retroflexa* Muhl.

*rosea* Schkuhr.

*scoparia* Schkuhr.

\**shortiana* Dewey. Rare.

*sparganioides* Muhl.

\**stipata* Muhl.

*tribuloides* Wahlenb.

*virescens* Muhl.

*willdenowii* Schkuhr.

*Cyperus aristatus* Rottb.

*diandrus* Torr.

*dipsaciformis* Fernald.

*erythrorhizus* Muhl.

*esculentus* L.

*lancastriensis* Porter.

*ovularis* (Michx.) Torr.

*refractus* Engelm.

*strigosus* L.

†*Dulichium arundinaceum* (L.) Britton. Extinct?

*Eleocharis capitata* (L.) R. Br.

*obtusa* (Willd.) Schult.

*Fimbristylis mucronulata* (Michx.) Blake.

*Scirpus atrovirens* Muhl.

ARACEAE. ARUM FAMILY.

*Arisaema dracontium* (L.) Schott. Green dragon.

*triphyllum* (L.) Torr. Jack-in-the-pulpit.

*Peltandra virginica* (L.) Kunth. Arrow arum.







LEMNACEAE. DUCKWEED FAMILY.

- Spirodela polyrrhiza* (L.) Schleid. Rare.  
*Wolffia columbiana* Karst. One record, Aug. 21, 1909, F. H. Blodgett.

COMMELINACEAE. SPIDERWORT FAMILY.

- Commelina erecta* L. Dayflower.  
*virginica* L.  
*Tradescantia virginica* L. Spiderwort.

PONTEDERIACEAE. PICKERELWEED FAMILY

- Heteranthera dubia* (Jacq.) MacM. Rare.  
*treniformis* R. & P. Extinct.

JUNCACEAE. RUSH FAMILY.

- Juncus bufonius* L. Toadrush.  
*dudleyi* Wiegand.  
*effusus* L.  
*tenuis* Willd.

MELANTHIACEAE. BUNCHFLOWER FAMILY.

- Uvularia perfoliata* L. Bellwort.

LILIACEAE. LILY FAMILY.

- Allium canadense* L. Meadow garlic.  
*cernuum* Roth. Wild onion.  
*triccoccum* Ait. Wild leek.  
*\*vineale* L. Wild garlic.  
*Erythronium albidum* Nutt. White troutlily.  
*americanum* Ker. Troutlily, dogtooth-violet.  
*Hemerocallis fulva* L. Orange daylily.  
*Muscari botryoides* (L.) Mill. Grape-hyacinth. Rare.  
*racemosum* (L.) Mill.  
*\*Ornithogalum nutans* L.  
*umbellatum* L. Star-of-Bethlehem.

CONVALLARIACEAE. LILY-OF-THE-VALLEY FAMILY.

- †*Asparagus officinalis* L. Asparagus.  
*Polygonatum biflorum* (Walt.) Ell. Solomonseal.  
*giganteum* Dietr.  
*Smilacina racemosa* (L.) Desf. (*Vagnera racemosa*.) False solomonseal.  
*Trillium sessile* L. Trillium.  
*var. luteum* Muhl.

SMILACACEAE. SMILAX FAMILY.

- Smilax glauca* var. *leurophylla* Blake. (*S. glauca*.)  
*herbacea* L. Carrionflower.  
*hispida* Muhl. Bristly greenbrier.  
*pulverulenta* Michx.  
*rotundifolia* L. Horsebrier.

AMARYLLIDACEAE. AMARYLLIS FAMILY.

- Narcissus biflorus* Curtis. Primrose narcissus.

DIOSCOREACEAE. YAM FAMILY.

- Dioscorea glauca* Muhl. Wild yam.  
*villosa* L.

IRIDACEAE. IRIS FAMILY.

- Belamcanda chinensis* (L.) DC. (*Gemmingia chinensis*.) Blackberry-lily.  
*\*Iris versicolor* L. Blue flag. Also observed on Island.  
*Sisyrinchium gramineum* Curtis. Blue-eyed-grass.

ORCHIDACEAE. ORCHID FAMILY.

- Aplectrum hyemale* (Muhl.) Torr. Puttyroot.

- Liparis liliifolia* (L.) L. Rich. Twayblade. Rare.  
*loeselii* (L.) L. Rich. Rare.  
†*Orchis spectabilis* L. Showy orchis.  
*Peramium pubescens* (Willd.) MacM. Rattlesnake-plantain.  
*Spiranthes beckii* Lindl. (*Ibidium beckii*.) Rare.  
\**gracilis* (Bigel.) Beck. (*I. gracile*.) Ladies-tresses. Rare.  
\**Tipularia unifolia* (Muhl.) Torr. Crane-fly orchis. Rare.  
*Triphora trianthophora* (Swartz) Rydb. Rare.

SAURURACEAE. LIZARDTAIL FAMILY.

- †*Saururus cernuus* L. Lizardtail. Extinct?

SALICACEAE. WILLOW FAMILY.

- Populus virginiana* Foug. Cottonwood.  
\**Salix babylonica* L. Weeping willow.  
*nigra* Marsh. Black willow.  
*wardii* Bebb. Rare.

JUGLANDACEAE. WALNUT FAMILY.

- Carya alba* (L.) K. Koch. (*Hicoria alba*.) Mockernut.  
*cordiformis* (Wang.) K. Koch. (*H. cordiformis*.) Bitternut.  
*glabra* (Mill.) Spach. (*H. glabra*.) Pignut.  
*ovata* (L.) K. Koch. (*H. ovata*.) Shagbark.  
*Juglans cinerea* L. Butternut.  
*nigra* L. Black walnut.

BETULACEAE. BIRCH FAMILY.

- Alnus rugosa* (DuRoi) Spreng. Alder. Formerly on Island (no specimen preserved); still on mainland.  
*Betula nigra* L. River birch, black birch.  
*Carpinus caroliniana* Walt. American hornbeam.  
*Ostrya virginiana* (Mill.) Willd. Hop hornbeam, ironwood.

FAGACEAE. BEECH FAMILY.

- Castanea dentata* (Marsh.) Borkh. Chestnut. Extinct on both Island and mainland; preserved specimen from mainland only.  
†*pumila* (L.) Mill. Chinquapin. Extinct, at least on Island.  
*Fagus grandifolia* Ehrh. Beech. One tree now on Island; several on mainland.  
*Quercus alba* L. White oak.  
\**bicolor* L. Swamp white oak. One tree.  
*coccinea* Muench. Scarlet oak.  
†*heterophylla* Michx. f. One tree.  
\**marylandica* Muench. Black jack.  
*maxima* (Marsh.) Ashe. (*Q. rubra* of authors.) Red oak.  
*montana* Willd. (*Q. prinus* of authors.) Chestnut oak.  
\**muhlenbergii* Engelm.  
*palustris* DuRoi. Pin oak.  
†*phellos* L. Willow oak. One tree formerly grew on Island.  
*prinus* L. (*Q. michauxii*.) Basket oak.  
*rubra* L. (*Q. falcata*.) Spanish oak.  
*saultii* C. Schneid. Saul oak.  
*stellata* Wang. Post oak.  
*velutina* Lam. Black oak.

ULMACEAE. ELM FAMILY.

- Celtis crassifolia* Lam.  
*mississippiensis* Bosc.  
*occidentalis* L. Hackberry, sugarberry.  
*Ulmus americana* L. American elm.  
*fulva* Michx. Slippery elm.







## MORACEAE. MULBERRY FAMILY.

- †*Maclura pomifera* (Raf.) C. Schneid. (*Toxylon pomiferum*.) Osage-orange.  
 \*†*Morus alba* L. White mulberry. Rare.  
*rubra* L. Red mulberry.

## URTICACEAE. NETTLE FAMILY.

- Boehmeria cylindrica* (L.) Swartz.  
*Cannabis sativa* L. Hemp. Rare.  
*Humulus lupulus* L. Hop. Rare.  
*Laportea canadensis* (L.) Gaud. (*Urticastrum divaricatum*.) Wood nettle.  
*Parietaria pennsylvanica* Muhl. Pellitory.  
*Pilea pumila* (L.) A. Gray. Richweed.  
*Urtica procera* Muhl. (*U. gracilis*.) Nettle.

## ARISTOLOCHIACEAE. BIRTHWORT FAMILY.

- Aristolochia serpentaria* L. Virginia snakeroot. Rare.  
*Asarum canadense* L. Wild ginger.

## POLYGONACEAE. BUCKWHEAT FAMILY

- Bilderdykia scandens* (L.) Greene.  
*Persicaria hydropiper* (L.) Opiz. Smartweed.  
*lappathifolia* (L.) S. F. Gray.  
*muhlenbergii* (Meisn.) Small.  
*orientalis* (L.) Spach. Princes-feather. Sporadic.  
*pennsylvanica* (L.) Small.  
*mitis* Gilib. Lady's-thumb.  
*punctata* (Ell.) Small. Smartweed.  
*Polygonum tenue* Michx.  
*Rumex acetosella* L. Sheep sorrel.  
*altissimus* Wood.  
*crispus* L. Yellow dock, narrow dock.  
*obtusifolius* L. Bitter dock.  
*verticillatus* L. Swamp dock.

- Tovara virginiana* (L.) Raf. (*T. virginica*.) Jumpseed.

## CHENOPODIACEAE. GOOSEFOOT FAMILY.

- Chenopodium album* L. Lambs-quarters, pigweed.  
*ambrosioides* L. Wormseed.

## AMARANTHACEAE. AMARANTH FAMILY.

- Amaranthus graecizans* L. Tumbleweed.  
*hybridus* L. Pigweed.  
*spinosus* L. Spiny amaranth.  
*Iresine rhizomatosa* Standl. The type of this species was collected on Plummers Island, October 3, 1915, by Paul C. Standley.

## PHYTOLACCACEAE. POKEWEED FAMILY.

- Phytolacca americana* L. Pokeweed.

## AIZOACEAE. CARPETWEED FAMILY.

- Mollugo verticillata* L. Carpetweed.

## PORTULACACEAE. PORTULACA FAMILY.

- Claytonia virginica* L. Springbeauty.  
*Portulaca oleracea* L. Purslane, pussley.

## CORRIGIOLACEAE. WHITLOW-WORT FAMILY.

- Anychia canadensis* (L.) B.S.P.  
*polygonoides* Raf.

## ALSINACEAE. CHICKWEED FAMILY.

- Arenaria serpyllifolia* L. Sandwort.  
*Cerastium longipedunculatum* Muhl. Nodding chickweed.  
*velutinum* Raf. Chickweed.  
*viscosum* L. Mouse-ear chickweed.

- \**Stellaria longifolia* Muhl. (*Alsine longifolia*.) Stitchwort.
- media* (L.) Cyrill. (*A. media*.) Common chickweed.
- pubera* Michx. (*A. pubera*.) Star chickweed.

SILENACEAE. PINK FAMILY.

- Dianthus armeria* L. Deptford pink. Formerly on Island (as well as mainland), but no Island specimen preserved.
- Saponaria officinalis* L. Bouncingbet.
- Silene alba* Muhl. Snowy campion.
- antirrhina* L. Sleepy catchfly.
- \**caroliniana* Walt. Wild pink.
- stellata* (L.) Ait. Starry campion.

RANUNCULACEAE. BUTTERCUP FAMILY.

- Anemone quinquefolia* L. Wood anemone.
- virginiana* L.
- \**Anemonella thalictroides* (L.) Spach. (*Syndesmon thalictroides*.) Rue anemone. Reported from Island also.
- Aquilegia canadensis* L. Columbine.
- Cimicifuga racemosa* (L.) Nutt. Black snakeroot.
- Clematis viorna* L. (*Viorna urnigera*.) Leatherflower.
- virginiana* L. Wild clematis.
- †*Delphinium tricornis* Michx. Dwarf larkspur. Extinct.
- Hepatica americana* Ker. Hepatica.
- Ranunculus abortivus* L. Small-flowered buttercup.
- hispidus* Michx.
- micranthus* Nutt.
- recurvatus* Poir.
- septentrionalis* Poir.
- Thalictrum caulophyllioides* Small. Meadowrue.
- polygamum* Muhl.
- revolutum* DC.

BERBERIDACEAE. BARBERRY FAMILY.

- Caulophyllum thalictroides* (L.) Michx. Blue cohosh.
- Jeffersonia diphylla* (L.) Pers. Twinleaf.
- Podophyllum peltatum* L. May-apple.

MENISPERMACEAE. MOONSEED FAMILY.

- Menispermum canadense* L. Moonseed.

MAGNOLIACEAE. MAGNOLIA FAMILY.

- Liriodendron tulipifera* L. Tuliptree, yellow poplar.
- \*†*Magnolia virginiana* L. Swamp magnolia. Rare.

ANNONACEAE. CUSTARD-APPLE FAMILY.

- Asimina triloba* Dunal. Pawpaw.

LAURACEAE. LAUREL FAMILY.

- Benzoin aestivale* (L.) Nees. Spicebush.
- Sassafras officinale* Nees & Eberm. (*S. variifolium*.) Sassafras.

PAPAVERACEAE. POPPY FAMILY.

- Chelidonium majus* L. Celandine.
- Papaver dubium* L. Poppy. Rare.
- Sanguinaria canadensis* L. Bloodroot.

FUMARIACEAE. FUMITORY FAMILY.

- Corydalis flavula* (Raf.) DC. (*Capnoides flavulum*.) Yellow corydalis.
- Dicentra canadensis* (Goldie) Walp. (*Bikukulla canadensis*.) Squirrel-corn.
- cucullaria* (L.) Bernh. (*B. cucullaria*.) Dutchmans-breeches.





BRASSICACEAE. MUSTARD FAMILY.

- Alliaria officinalis* Andr. Garlic mustard.  
*Arabidopsis thaliana* (L.) Britton. Mouse-ear cress.  
*Arabis canadensis* L. Sickie-pod.  
     *dentata* Torr. & Gray.  
     *laevigata* (Muhl.) Poir.  
     *lyrata* L.  
*Barbarea verna* (Mill.) Aschers. (*Campe verna*.) Winter-cress.  
     *vulgaris* R. Br. (*C. barbarea*.)  
*Brassica campestris* L. Turnip.  
     *juncea* (L.) Coss.  
     *nigra* (L.) Koch. Black mustard.  
*Capsella bursa-pastoris* (L.) Medic. (*Bursa bursa-pastoris*.) Shepherd-purse.  
*Cardamine bulbosa* (Schreb.) B.S.P.  
     *parviflora* L.  
     *pennsylvanica* Muhl.  
*Dentaria heterophylla* Nutt. Pepper-root.  
     *laciniata* Muhl.  
*Draba verna* L. Whitlow-grass.  
† *Hesperis matronalis* L. Dames-violet.  
*Lepidium campestre* (L.) R. Br. Fieldcress.  
     *virginicum* L. Peppergrass.  
*Radicula nasturtium-aquaticum* (L.) Britten & Rendle. (*Sisymbrium nasturtium-aquaticum*.) Watercress.  
     *palustris* (L.) Moench.  
     *sessiliflora* (Nutt.) Greene.  
     *sylvestris* (L.) Druce.

CRASSULACEAE. STONECROP FAMILY.

- Sedum ternatum* Michx. Threeleaf stonecrop.

PENTHORACEAE. DITCH-STONECROP FAMILY.

- Penthorum sedoides* L. Ditch-stonecrop.

SAXIFRAGACEAE. SAXIFRAGE FAMILY.

- Heuchera americana* L. Alumroot.  
*Saxifraga virginiana* Michx. Early saxifrage.

HYDRANGEACEAE. HYDRANGEA FAMILY.

- Hydrangea arborescens* L. Wild hydrangea.

HAMAMELIDACEAE. WITCH-HAZEL FAMILY.

- Hamamelis virginiana* L. Witch-hazel.

PLATANACEAE. SYCAMORE FAMILY.

- Platanus occidentalis* L. Buttonwood, sycamore.

ROSACEAE. ROSE FAMILY.

- \* *Agrimonia parviflora* Ait. Agrimony.  
     *pubescens* Wallr.  
     *rostellata* Wallr.  
\* *Aruncus vulgaris* Raf. Goatsbeard.  
† *Duchesnea indica* (Andr.) Focke. False strawberry.  
*Fragaria virginiana* Duchesne. Wild strawberry.  
*Geum canadense* Jacq. Avena.  
     *meyerianum* Rydb.  
     \* *strictum* Ait.  
*Physocarpus opulifolius* (L.) Maxim. (*Opulaster opulifolius*.) Ninebark.  
\* *Porteranthus trifolius* (L.) Britton. False ipecac.  
*Potentilla canadensis* L. (*P. pumila* of D. C. Flora.) Cinquefoil, fivefinger.  
     *monspeliensis* L. Sporadic.  
     *simplex* var. *calvescens* Fernald. (*P. canadensis* of D. C. Flora.)



*Rosa carolina* L. (*R. virginiana*.)

\**palustris* Marsh

*Rubus argutus* Link. Blackberry.

\**enslenii* Tratt.

*flagellaris* Willd.

*occidentalis* L. Black raspberry.

*ostryifolius* Rydb.

*phoenicolasius* Maxim. Wineberry.

(Our specimens of *Rubus* have been examined by Dr. L. H. Bailey.)

\**Spiraea thunbergii* Sieb. *Spiraea*. Escape.

#### MALACEAE. APPLE FAMILY.

\**Amelanchier canadensis* (L.) Medic. Shadbush. Rare on mainland; formerly reported from Island also.

*Crataegus uniflora* Moench. Hawthorn. Rare on mainland; two plants formerly on Island also. Preserved specimen from mainland only.

\**Malus sylvestris* Mill. Apple.

\**Pyrus communis* L. Pear.

#### AMYGDALACEAE. PEACH FAMILY.

\*†*Amygdalus persica* L. Peach.

*Prunus americana* Marsh. Wild plum.

*avium* L. Sweet cherry.

*serotina* Ehrh. Wild black cherry.

#### CAESALPINIACEAE. SENNA FAMILY.

*Cassia marylandica* L. Wild senna.

*Cercis canadensis* L. Redbud.

*Chamaecrista fasciculata* (Michx.) Greene. Partridge pea.

*nictitans* (L.) Moench. Sensitive pea.

*Gleditsia triacanthos* L. Honey locust. Rare.

#### FABACEAE. BEAN FAMILY.

*Amphicarpa bracteata* (L.) Fernald. (*Falcata comosa*.) Hog peanut.

†*Astragalus carolinianus* L. Milkvetch. Extinct?

†*Baptisia australis* (L.) R. Br. Blue wild-indigo. Sporadic.

\**tinctoria* (L.) R. Br. Yellow wild-indigo.

*Chitoria mariana* L. Butterfly-pea.

\**Desmodium bracteosum* (Michx.) DC. (*Meibomia bracteosa*.) Tick trefoil.

*canescens* (L.) DC. (*M. canescens*.)

*dillenii* Darl. (*M. dillenii*.)

*nudiflorum* (L.) DC. (*M. nudiflora*.)

\**pauciflorum* (Nutt.) DC. (*M. pauciflora*.)

†*Glycine apios* L. Potato bean. Probably extinct.

*Lespedeza capitata* Michx. Bushclover.

*frutescens* (L.) Ell.

*procumbens* Michx.

\**repens* (L.) Bart.

*violacea* (L.) Nutt.

\**Medicago lupulina* L. Black medic.

*Melilotus alba* Desr. White sweet clover.

*Robinia pseudoacacia* L. Black locust.

*Tephrosia virginiana* (L.) Pers. (*Cracca virginiana*.) Goat rue. Rare.

*Trifolium arvense* L. Rabbitfoot clover.

*hybridum* L. Alsike clover.

\**pratense* L. Red clover.

\**Vicia angustifolia* (L.) Reichard. Vetch.

*caroliniana* Walt.

#### GERANIACEAE. GERANIUM FAMILY.

*Geranium carolinianum* L.

*maculatum* L. Wild geranium.







OXALIDACEAE. OXALIS FAMILY.

- Ionoqualis violacea* (L.) Small. Violet wood-sorrel.  
*Xanthoxalis cymosa* Small. (*X. grandis*.)  
*filipes* Small.  
*stricta* (L.) Small.

LINACEAE. FLAX FAMILY.

- Linum medium* (Planch.) Britton.

RUTACEAE. RUE FAMILY.

- †*Ptelea trifoliata* L. Hop tree.

SIMARUBACEAE. QUAESIA FAMILY.

- Ailanthus altissima* (Mill.) Swingle. Ailanthus, tree-of-heaven.

POLYGALACEAE. MILKWORT FAMILY.

- †*Polygala polygama* Walt.

- †*verticillata* L.

EUPHORBIACEAE. SPURGE FAMILY.

- Acalypha digyneia* Raf. Three-seeded mercury.

- gracilens* A. Gray.

- virginica* L.

- Chamaesyce maculata* (L.) Small. Spotted spurge, milk purslane.

- preslii* (Guss.) Arth.

- Phyllanthus caroliniensis* Walt. Rare.

- Tithymalopsis paniculata* (L.) Ell.

- Tithymalus commutatus* (Engelm.) Klotzsch & Garcke.

CALLITRICHACEAE. WATER-STARWORT FAMILY.

- Callitriche austini* Engelm.

LIMNANTHACEAE. FALSE MERMAID FAMILY.

- Floerkea proserpinacoides* Willd. False mermaid. Rare.

ANACARDIACEAE. SUMAC FAMILY.

- Rhus copallina* L. Dwarf sumac.

- \**glabra* L. Smooth sumac.

- typhina* L. (*R. hirta*.) Staghorn sumac.

- Toxicodendron radicans* (L.) Kuntze. Poison-ivy.

- \**vernix* (L.) Kuntze. Poison sumac. Extinct.

AQUIFOLIACEAE. HOLLY FAMILY.

- †*Ilex opaca* Ait. Holly. Formerly one plant grew on Island.

- \**verticillata* (L.) A. Gray. Winterberry, black alder.

CELASTRACEAE. BITTERSWEET FAMILY.

- Celastrus scandens* L. Bittersweet. Rare.

- Euonymus americanus* L. Strawberry-bush.

- atropurpureus* Jacq. Wahoo.

STAPHYLEACEAE. BLADDERNUT FAMILY.

- Staphylea trifolia* L. Bladdernut.

ACERACEAE. MAPLE FAMILY.

- Acer rubrum* L. Red maple.

- saccharinum* L. Silver maple.

- saccharum* Marsh. Sugar maple.

- Rulac negundo* (L.) Hitchc. Boxelder.

IMPATIENTACEAE. TOUCH-ME-NOT FAMILY.

- Impatiens biflora* Walt. Orange jewelweed, spotted touch-me-not.

- pallida* Nutt. Pale jewelweed.

RHAMNACEAE. BUCKTHORN FAMILY.

- \**Ceanothus americanus* L. New Jersey tea. Rare.

VITACEAE. GRAPE FAMILY.

*Parthenocissus quinquefolia* (L.) Planch. Virginia creeper.

*Vitis aestivalis* Michx. Summer grape.

*argentifolia* Munson.

*cordifolia* Michx. Chicken grape.

\**labrusca* L. Fox grape. Rare.

*vulpina* L. Frost grape.

(Our specimens of *Vitis* have been examined by Dr. L. H. Bailey.)

TILIACEAE. LINDEN FAMILY.

*Tilia neglecta* Spach. Linden, basswood.

MALVACEAE. MALLOW FAMILY.

*Abutilon theophrasti* Medic. Velvetleaf. Rare.

*Hibiscus militaris* Walt. Rose mallow.

*palustris* L. Swamp mallow.

*Sida hermaphrodita* (L.) Rusby. Virginia mallow.

*spinosa* L.

HYPERICACEAE. ST. JOHNSWORT FAMILY.

*Ascyrum hypericoides* L. St. Andrews-cross.

*Hypericum mutilum* L.

\**perforatum* L. Common St. Johnswort.

*prolificum* L.

*punctatum* Lam. (*H. denticulatum* of D. C. Flora, not Walt.)

*Sarothra gentianoides* L. Orange pinweed.

CISTACEAE. ROCKROSE FAMILY.

*Lechea racemulosa* Lam. Pinweed.

VIOLACEAE. VIOLET FAMILY.

*Cubelium concolor* (Forst.) Raf. Green violet.

*Viola cucullata* Ait. Swamp violet.

*eriocarpa* Schwein. Yellow violet.

*papilionacea* Pursh. Butterfly violet.

*rafinesquii* Greene. Field pansy.

*sororia* Willd. Downy violet.

*stoneana* House.

*striata* Ait. Cream violet.

\**triloba* Schwein.

PASSIFLORACEAE. PASSIONFLOWER FAMILY.

*Passiflora lutea* L.

CACTACEAE. CACTUS FAMILY.

*Opuntia compressa* (Salisb.) Macbride. (*O. vulgaris*.) Prickly-pear.

DAPHNACEAE. DAPHNE FAMILY.

*Dirca palustris* L. Leatherwood.

LYTHRACEAE. LOOSESTRIFE FAMILY.

*Cuphea petiolata* (L.) Koehne. (*Parsonsia petiolata*.)

*Rotula ramosior* (L.) Koehne. Rare.

ONAGRACEAE. EVENING-PRIMROSE FAMILY.

*Circaea latifolia* Hill. Enchanters-nightshade.

*Epilobium coloratum* Muhl. Willow-herb.

*Gaura biennis* L.

*Isnarda palustris* L. Water-purslane.

\**Kneiffia fruticosa* (L.) Raimann. Sundrops.

*Ludwigia alternifolia* L. Seedbox.

*Oenothera gauroides* Hornem. (*O. biennis* in part.) Evening-primrose.

ARALIACEAE. GINSENG FAMILY.

\**Aralia spinosa* L. Angelica tree.







## APIACEAE. PARSLEY FAMILY.

- \**Angelica villosa* (Walt.) B.S.P.
- Chaerophyllum procumbens* (L.) Crantz. Chervil.
- †*Cicula maculata* L. Water hemlock.
- Cryptotaenia canadensis* (L.) DC. (*Deringa canadensis*.) Honewort.
- †*Daucus carota* L. Wild carrot, Queen-Anne's-lace.
- Erigenia bulbosa* (Michx.) Nutt. Harbinger-of-spring.
- Osmorhiza claytoni* (Michx.) Clarke. Sweet-cicely.
- longistylis* (Torr.) DC. Sweet-cicely.
- var. *brachycoma* Blake.
- var. *villicaulis* Fernald.
- †*Pastinaca sativa* L. Parsnip.
- Sanicula canadensis* L. Sanicle, bur snakeroot.
- gregaria* Bicknell.
- marylandica* L.
- \**Thaspium barbinode* (Michx.) Nutt. Meadow parsnip.

## CORNACEAE. DOGWOOD FAMILY.

- †*Cornus alternifolia* L. Extinct.
- amomum* Mill. Silky dogwood.
- florida* L. Flowering dogwood.
- stolonifera* Michx. Red-osier dogwood.
- Nyssa sylvatica* L. Tupelo, black gum.

## PYROLACEAE. SHINLEAF FAMILY.

- \**Chimaphila maculata* (L.) Nutt. Spotted pipsissewa, spotted wintergreen.

## MONOTROPACEAE. INDIANPIPE FAMILY.

- †*Monotropa uniflora* L. Indianpipe.

## ERICACEAE. HEATH FAMILY.

- \**Azalea nudiflora* L. Pink azalea.
- Kalmia latifolia* L. Mountain laurel.
- \*†*Xolisma ligustrina* (L.) Britton.

## VACCINIACEAE. BLUEBERRY FAMILY.

- Polycodium stamineum* (L.) Greene. Deerberry.
- \**Vaccinium atrococcum* (A. Gray) Heller. Early highbush blueberry.
- vacillans* Kalm. Dryland blueberry.

## PRIMULACEAE. PRIMROSE FAMILY.

- Anagallis arvensis* L. Pimpernel, poor-mans-weatherglass. Rare.
- Samolus floribundus* H.B.K. Rare.
- Steironema ciliatum* (L.) Raf. Fringed loosestrife.

## OLEACEAE. OLIVE FAMILY.

- Chionanthus virginica* L. Fringetree.
- Frazinus americana* L. White ash.
- pennsylvanica* Marsh. Red ash.
- var. *lanceolata* (Borckh.) Sarg. Green ash.

## DIOSPYRACEAE. PERSIMMON FAMILY.

- Diospyros virginiana* L. Persimmon. Rare.

## GENTIANACEAE. GENTIAN FAMILY.

- Gentiana villosa* L. Striped gentian. Rare.
- †*Obolaria virginica* L. Pennywort.
- Sabatia angularis* (L.) Pursh. Rose-gentian. Sporadic.

## APOCYNACEAE. DOGBANE FAMILY.

- Apocynum cannabinum* L. Indian-hemp.
- medium* Greene.
- pubescens* R. Br.

ASCLEPIADACEAE. MILKWEED FAMILY.

- Asclepias incarnata* L. Swamp milkweed.  
 \*†*syriaca* L. Common milkweed.  
 \*†*tuberosa* L. Butterfly-weed, pleurisy-root.  
*Gonolobus laevis* Michx.  
 †*Vincetoxicum obliquum* (Jacq.) Britton.

CONVOLVULACEAE. MORNING-GLORY FAMILY.

- \**Convolvulus sepium* L. Bindweed. Also reported from Island.  
*Ipomoea hederacea* Jacq.  
*lacunosa* L.  
 \*†*pandurata* (L.) Meyer. Wild potato vine.

CUSCUTACEAE. DODDER FAMILY.

(Identified by T. G. Yuncker.)

- Cuscuta campestris* Yuncker. (*C. arvensis*.)  
*gronovii* Willd.  
 var. *vulvivaga* Engelm.  
*polygonorum* Engelm.

POLEMONIACEAE. PHLOX FAMILY.

- Phlox divaricata* L. Blue phlox.  
*paniculata* L. Wild sweet-william.  
 \*†*subulata* L. Moss-pink. Extinct.

HYDROPHYLLACEAE. WATERLEAF FAMILY.

- Hydrophyllum canadense* L. Waterleaf.  
*virginianum* L.  
*Nyctelea ambigua* (Nutt.) Standl.  
*Phacelia covillei* S. Wats.  
*dubia* (L.) Small.  
*purshii* Buckl.

BORAGINACEAE. BORAGE FAMILY.

- Lappula virginiana* (L.) Greene. Stickseed.  
*Mertensia virginica* (L.) DC. Virginia bluebell. Some specimens have white flowers.  
*Myosotis laxa* Lehm. Forget-me-not. Rare.

VERBENACEAE. VERVAIN FAMILY.

- Lippia lanceolata* Michx.  
*Verbena angustifolia* Michx. Narrow-leaf vervain.  
 \*†*thastata* L. Blue vervain.  
*urticifolia* L. White vervain.

MENTHACEAE. MINT FAMILY.

- Agastache nepetoides* (L.) Kuntze. Giant hyssop.  
*Clinopodium vulgare* L.  
*Collinsonia canadensis* L. Horsebalm.  
*Cunila origanoides* (L.) Britton. Dittany.  
*Glechoma hederacea* L. Ground-ivy, robin-runaway.  
*Hedeoma pulegioides* (L.) Pers. American pennyroyal.  
*Leonurus cardiaca* L. Motherwort.  
*Lycopus americanus* Ell. Water horehound.  
*virginicus* L.  
*Mentha canadensis* L. Wild mint.  
*Monarda clinopodia* L.  
*Nepeta cataria* L. Catnip.  
*Perilla frutescens* (L.) Britton. Perilla.  
*Prunella vulgaris* L. Selfheal, healall.  
*Pycnanthemum flexuosum* (Walt.) B.S.P. (*Koellia flexuosa*.) Mountain-mint.  
 \*†*incanum* (L.) Michx. (*K. incana*.)





*Salvia lyrata* L. Lyre-leaf sage.  
*Scutellaria epilobifolia* Hamilt. (*S. lateriflora*.) Mad-dog skullcap.  
*ovalifolia* Pers.  
*Teucrium canadense* L. Wood-sage, germander.  
*Trichostema dichotomum* L. Blue-curls.

SOLANACEAE. NIGHTSHADE FAMILY.

*Datura stramonium* L. Jimsonweed.  
*Physalis heterophylla* Nees. Ground-cherry.  
*pubescens* L.  
*subglabrata* Mackenzie & Bush. (*P. philadelphica* of District Flora, Suppl. 7.)  
*Solanum carolinense* L. Horse-nettle.  
*nigrum* L. Nightshade.

SCROPHULARIACEAE. FIGWORT FAMILY.

†*Chelone glabra* L. Turtlehead.  
*Gratiola neglecta* Torr.  
*Ilysanthes dubia* (L.) Barnhart.  
*Leptandra virginica* (L.) Nutt.  
*Linaria vulgaris* Hill. Butter-and-eggs.  
*Mecardonia acuminata* (Walt.) Small.  
*Mimulus alatus* Soland. Monkeyflower.  
\*†*Paulownia tomentosa* (Thunb.) Baill. Empress tree.  
*Pentstemon hirsutus* (L.) Willd.  
*Scrophularia marilandica* L. Figwort.  
*Verbascum blattaria* L. Moth mullein.  
*thapsus* L. Common mullein.  
*Veronica arvensis* L. Corn speedwell.  
*hederaefolia* L. Ivy-leaf speedwell.  
*peregrina* L. Purslane speedwell.

BIGNONIACEAE. BIGNONIA FAMILY.

*Bignonia radicans* L. Trumpet creeper.  
\**Catalpa bignonioides* Walt. Catalpa.

OROBANCHACEAE. BROOMRAPE FAMILY.

*Thalesia uniflora* (L.) Britton. One-flowered cancer-root.

ACANTHACEAE. ACANTHUS FAMILY.

*Dianthera americana* L. Water-willow.  
*Ruellia strepens* L. Ruellia.

PLANTAGINACEAE. PLANTAIN FAMILY.

*Plantago lanceolata* L. Buckhorn plantain, English plantain.  
*rugelii* Decaisne.  
*virginica* L.

RUBIACEAE. MADDER FAMILY.

*Cephalanthus occidentalis* L. Buttonbush.  
*Diodia teres* Walt. Poorweed.  
*Galium aparine* L. Goosegrass.  
*circaezans* Michx. Wild licorice.  
*concinnum* Torr. & Gray. Shining bedstraw.  
*pilosum* Ait. Hairy bedstraw.  
\**tinctorium* L.  
*triflorum* Michx. Sweet-scented bedstraw.  
*Houstonia coerulea* L. Bluets.  
*longifolia* Gaertn.  
*purpurea* L.  
*Mitchella repens* L. Partridgeberry.

CAPRIFOLIACEAE. HONEYSUCKLE FAMILY.

- Lonicera japonica* Thunb. Japanese honeysuckle.  
*Sambucus canadensis* L. Elderberry. Rare.  
*Symphoricarpos orbiculatus* Moench. Coralberry, Indian currant.  
 \**Triosteum aurantiacum* Bicknell. Horse-gentian.  
*Viburnum acerifolium* L. Maple-leaf viburnum.  
*prunifolium* L. Black haw.  
*pubescens* (Ait.) Pursh.

VALERIANACEAE. VALERIAN FAMILY.

- Valeriana pauciflora* Michx.  
*Valerianella locusta* (L.) Betsche. Corn salad.

CUCURBITACEAE. GOURD FAMILY.

- Echinocystis lobata* (Michx.) Torr. & Gray. (*Micrampelis lobata*.) Wild cucumber.  
*Sicyos angulatus* L. Star cucumber.

CAMPANULACEAE. BELLFLOWER FAMILY.

- Campanula americana* L.  
*Specularia perfoliata* (L.) A. DC. Venus-looking-glass.

LOBELIACEAE. LOBELIA FAMILY.

- Lobelia cardinalis* L. Cardinalflower.  
*inflata* L. Indian tobacco.  
*syphilitica* L. Great lobelia.

CICHORIACEAE. CHICORY FAMILY.

- Hieracium venosum* L.  
*Krigia virginica* (L.) Willd.  
*Lactuca canadensis* L. Wild lettuce.  
*floridana* (L.) Gaertn.  
*spicata* (Lam.) Hitchc. Blue lettuce.  
 var. *integrifolia* (A. Gray) Britton.  
 \**villosa* Jacq.  
*Taraxacum laevigatum* (Willd.) DC. (*Leontodon erythrospermum*.) Red-seeded dandelion.  
*officinale* Weber. (*L. taraxacum*.) Dandelion.

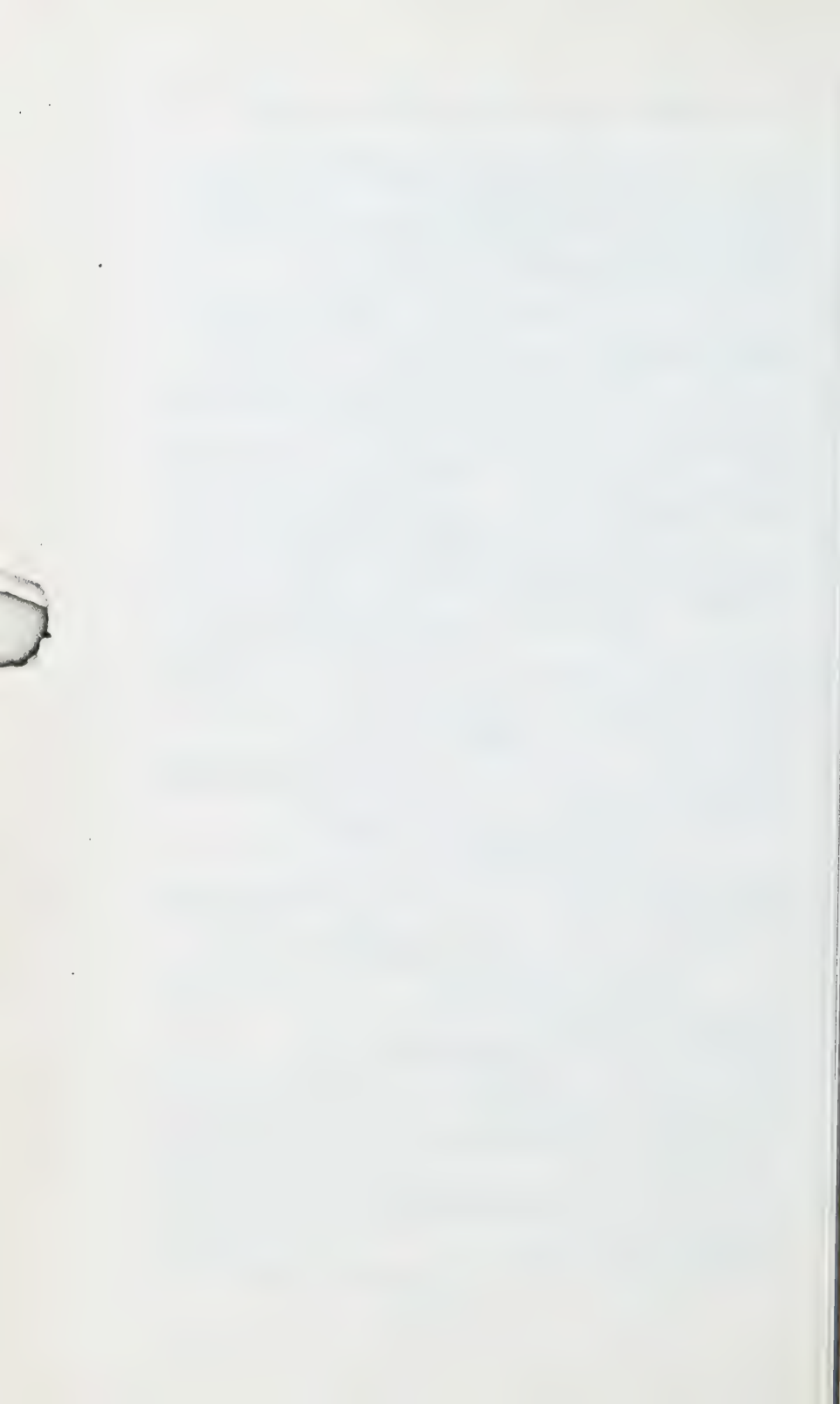
AMBROSIACEAE. RAGWEED FAMILY.

- Ambrosia elatior* L. Common ragweed.  
*trifida* L. Great ragweed.  
*Xanthium pungens* Wallr. (*X. americanum*; *X. chinense* of authors.) Cocklebur.  
*saccharatum* Wallr. (*X. commune*; *X. pennsylvanicum* of authors.)

ASTERACEAE. ASTER FAMILY.

- Achillea millefolium* L. Yarrow, milfoil.  
*Antennaria arnoglossa* Greene. Pussetoes.  
*plantaginifolia* (L.) Richards.  
*Anthemis arvensis* L. Corn camomile. Sporadic.  
*Arctium minus* Schkuhr. Burdock.  
*Artemisia annua* L. Sweet wormwood.  
*Aster cordifolius* L. Blue wood aster.  
*divaricatus* L. White wood aster.  
*novae-angliae* L. New England aster.  
*paniculatus* Lam.  
*patens* Ait.  
*pilosus* var. *demotus* Blake. (*A. ericoides*.)  
*prenanthoides* Muhl.  
 \**puniceus* L. Red-stalked aster.  
*sagittifolius* Willd.







- Bidens aristosa* var. *fritcheyi* Fernald. Sporadic.  
     var. *mutica* (A. Gray) Gattinger. Sporadic.  
*bipinnata* L. Spanish needles.  
*comosa* (A. Gray) Wiegand.  
*connata* Muhl.  
*vulgata* Greene. Beggar-ticks.  
 \**Chrysanthemum leucanthemum* L. Daisy.  
 \**Chrysogonum virginianum* L. Golden star.  
 \*†*Chrysopsis mariana* (L.) Ell. Golden-aster.  
*Cirsium altissimum* (L.) Spreng. Thistle.  
 \**Coreopsis verticillata* L.  
 \**Doellingeria infirma* (Michx.) Britton.  
*Eclipta alba* (L.) Hassk.  
*Elephantopus carolinianus* Raeusch. Elephantfoot.  
*Erechtites hieracifolia* (L.) Raf. Fireweed.  
*Erigeron annuus* (L.) Pers. Whitetop.  
     *canadensis* L. (*Leptilon canadense*.) Horsecweed.  
     *philadelphicus* L. Fleabane.  
     *pulchellus* Michx. Robins-plantain.  
*Eupatorium altissimum* L.  
     *coelestinum* L. Mistflower.  
     †*perfoliatum* L. Boneset.  
     *pubescens* Muhl.  
     *purpureum* L. Joe-pye-weed.  
     \**sessilifolium* L. Upland boneset.  
     *urticaefolium* Reichard. White snakeroot.  
*Euthamia graminifolia* (L.) Nutt. Narrowleaf goldenrod.  
*Galinsoga caracasana* (DC.) Schultz Bip.  
     *ciliata* (Raf.) Blake. (*G. parviflora hispida*.)  
*Gnaphalium obtusifolium* L. Sweet everlasting.  
*Helenium autumnale* L. Sneezeweed.  
*Helianthus decapetalus* L. Sunflower.  
*Heliopsis helianthoides* (L.) Sweet. Ox-eye.  
 \**Mesadenia atriplicifolia* (L.) Raf.  
*Polymnia canadensis* L. Leafycup.  
     *wedalia* L.  
*Ridgwaya alternifolia* (L.) Britton.  
 \**Rudbeckia fulgida* Ait. Orange coneflower.  
     \**hirta* L. Black-eyed-susan.  
     *laciniata* L.  
     *triloba* L.  
*Senecio aureus* L. Golden ragwort.  
     \**obovatus* Muhl.  
*Solidago bicolor* L. Silver-rod.  
     *caesia* L. Blue-stem goldenrod.  
     *canadensis* L.  
     *flexicaulis* L.  
     *juncea* Ait. Early goldenrod.  
     *racemosa* Greene.  
     *serotina* Ait.  
     *ulmifolia* Muhl.  
*Synosme suaveolens* (L.) Raf.  
*Verbesina occidentalis* (L.) Walt. Yellow crownbeard.  
*Vernonia noveboracensis* (L.) Willd. Ironweed.

## III. MOSSES.

BY E. C. LEONARD.

In the present list 82 species of mosses are recorded from Plummers Island, Montgomery County, Maryland, and the adjacent "mainland" property of the Washington Biologists' Field Club, of which 62 are definitely known from the Island and 20 (marked by an asterisk) only from the mainland. All except *Buxbaumia aphylla* are represented by preserved specimens.

## DITRICHACEAE.

- \**Pleuridium alternifolium* (Kaulf.) Rabenh. Old fields.
- Ditrichum lineare* (Sw.) Lindb. (*D. vaginans*). Soil in open places, often bordering paths through old fields.
- Ditrichum pallidum* (Schreb.) Hampe. Soil in woods.

## DICRANACEAE.

- Bruchia sullivantii* Aust. Old fields.
- Dicranella heteromalla* (L.) Schimp. Soil in open woods, rarely on rotten logs.
- \**Dicranum flagellare* Hedw. Rotten logs in low swampy places.
- Dicranum fulvum* Hook. On rocks.
- Dicranum scoparium* (L.) Hedw. Abundant, forming cushions on soil in rich woods, rarely on rocks.

## LEUCOBRYACEAE.

- Leucobryum glaucum* (L.) Schimp. Forming white or light green cushions on soil, usually in thin woods.

## FISSIDENTACEAE.

- \**Fissidens cristatus* Wils. Swampy soil.
- Fissidens osmundoides* (Sw.) Hedw. Damp shaded soil on banks, rotten wood, or in crevices of rock.
- Fissidens subbasilaris* Hedw. Trees and rocks.

## POTTIACEAE.

- \**Astomum sullivantii* Schimp. Field bordering towpath.
- \**Weisia viridula* (L.) Hedw. Field bordering towpath.
- \**Tortella caespitosa* (Schwaegr.) Limpr. Soil, roots of trees, and rotten logs.

## PTYCHOMITRIACEAE.

- Ptychomitrium incurvum* (Schwaegr.) Sulliv. Rocks; west end of Island.

## GRIMMIACEAE.

- Grimmia campestris* Bruch. (*G. leucophea* Grev.) Common on rock outcrop.
- Grimmia olneyi* Sulliv. Rock outcrop; west end of Island.
- Grimmia pennsylvanica* Schwaegr. Common on rock outcrop.

## ORTHOTRICHACEAE.

- Drummondia clavellata* Hook. On bark.
- \**Orthotrichum ohioense* S. & L. On trees.
- Orthotrichum pusillum* Mitt. (*O. psilocarpum* James.) On trees.
- Ulota ulophylla* Ehrh. (*U. crispa* Brid.) On bark.







EPHEMERACEAE.

*Ephemerum serratum* (Schreb.) Hampe. Shady mud banks.

FUNARIACEAE.

*Physcomitrium turbinatum* (Mx.) Brid. Soil or occasionally rotten wood, in old fields or open woods.

BRYACEAE.

*Bryum capillare* L. Crevices of Cactus Rock. Not previously reported from the vicinity of the District of Columbia.

MNIACEAE.

*Mnium affine ciliare* (Grev.) C. M. Low wet soil, often at base of trees.

*Mnium cuspidatum* (L.) Leyss. (*M. sylvaticum* Lindb.) Low wet soil.

AULACOMNIACEAE.

\**Aulacomnium heterostichum* (Hedw.) B. & S. Base of trees in rich woods.

\**Aulacomnium palustre* Schwaegr. Rotten logs or soil in wet shaded hollows.

BARTRAMIACEAE.

*Bartramia pomiformis* (L.) Hedw. On rocks or soil in moist woods.

DIPHYSICIACEAE.

\**Diphyscium sessile* (Schmid.) Lindb. (*Webera sessilis* Lindb.) Bare moist banks.

BUXBAUMIACEAE.

\**Buxbaumia aphylla* L. Has been collected on a thinly wooded bank near the towpath, but no specimens are preserved.

POLYTRICHACEAE.

*Catharinea angustata* Brid. Abundant on shady soil.

*Catharinea undulata* (L.) Web. & Mohr. Common on low moist soil.

*Polytrichum commune* L. Soil, especially in rocky open places or thin woods.

*Polytrichum ohioense* R. & C. Common. Soil in woods, rarely in open places.

HEDWIGIACEAE.

*Hedwigia albicans* (Web.) Lindb. On rocks.

CLIMACIACEAE.

*Climacium americanum* Brid. Wet or dry soil, rocks, or rotten wood in thin woods.

\**Climacium kindbergii* (R. & C.) Grout. Swamps, often growing in shallow water.

LEUCODONTACEAE.

*Forsstroemia trichomitria* (Hedw.) Lindb. On trees.

*Leucodon julaceus* (Hedw.) Sulliv. Tree trunks.

ENTODONTACEAE.

*Entodon cladorrhizans* (Hedw.) C. M. Usually on rotten logs, but sometimes on muddy rocks, soil, and base of trees.

*E. lodon seductrix* (Hedw.) C. M. Rotten wood, rocks, soil, base of trees.

THELIACEAE.

*Thelia asprella* Sulliv. In loosely adherent mats on base of trees and stumps.

*Thelia hirtella* (Hedw.) Sulliv. Forming whitish green mats on base of trees and stumps.

*Thelia lescurei* Sulliv. Rocks or dry sandy soil.

THUIDIACEAE.

*Anomodon attenuatus* (Schreb.) Hueben. Abundant on rocks and bases of trees.

- Anomodon minor* (Beauv.) Fuern. Base of rough-barked trees, or occasionally on rocks.  
*Anomodon rostratus* (Hedw.) Schimp. In dense yellowish green mats on rocks or at base of trees.  
*\*Haplocladium microphyllum* (Sw.) Broth. Moist logs, or occasionally on rocks.  
*\*Haplocladium virginianum* (Brid.) Broth. On ground, stumps, or roots in open woods.  
*Helodium paludosum* (Sulliv.) Aust. Wet grassy places.  
*Thuidium delicatulum* (L.) Mitt. Stones, earth, rotten logs, etc., in damp shady places.  
*Thuidium recognitum* (L.) Hedw. Soil, rocks, and rotten wood, in damp shady places.  
*Leskea polycarpa* Ehrh. Base of trees, rotten wood, or rarely stones.  
*Leskea arenicola* Best. Usually on base of trees.  
*Leskea gracilescens* Hedw. Base of trees or on rotten wood.  
*Leskea obscura* Hedw. Base of trees, rotten wood, or occasionally on rocks.

#### AMBLYSTEGIACEAE.

- Amblystegium juratzkanum* Schimp. Moist soil, stones, and rotten wood.  
*Amblystegium kochii* Bryol. Eur. Soil or rotten logs, in swampy places.  
*\*Amblystegium orthocladon* (Beauv.) Jaeger. Stones, rotten wood, base of trees, etc., in moist places in woods.  
*Amblystegium riparium* (L.) Bryol. Eur. In swamps and on base of trees, roots, etc.  
*Amblystegium serpens* (L.) Bryol. Eur. Base and roots of trees, rotten logs, soil, rocks, etc., in moist woods.  
*Amblystegium varium* (Hedw.) Lindb. Base and roots of trees, rotten logs, soil, rocks, etc., in moist woods.  
*Campylium hispidulum* (Brid.) Mitt. Base and roots of trees, old logs, soil, etc., in moist shaded places.

#### HYPNACEAE.

- Homomallium adnatum* (Hedw.) Broth. Rocks or occasionally on trees or logs.  
*Platygyrium repens* (Brid.) Bryol. Eur. Common on bark, old logs, and stumps.  
*Pylaisia intricata* (Hedw.) Card. On bark.  
*\*Pylaisia schimperii* Card. On bark.  
*Stereodon curvifolius* (Hedw.) Mitt. Rotten logs or occasionally on rocks in moist woods.  
*Stereodon imponens* (Hedw.) Lindb. On logs, earth, stones, etc., in moist woods.  
*Isopterygium deplanatum* (Sulliv.) Mitt. Soil, stones, rotten wood, etc., in woods.

#### BRACHYTHECIACEAE.

- Homalotheciella subcapillata* (Hedw.) Broth. On bark and logs.  
*Brachythecium acuminatum* (Hedw.) Kindb. Rocks, soil, base of trees, rotten logs, etc., in woods.  
*Brachythecium oxycladon* (Brid.) Jaeger. Rocks, roots, and base of trees, earth, etc., in woods.  
*Brachythecium plumosum* (Sw.) B. & S. On stones, logs, etc.  
*Brachythecium salebrosum* (Hoffm.) Bryol. Eur. Earth, stones, base and roots of trees, rotten wood, etc., in moist woods.  
*Cirriphyllum boscii* (Schwaegr.) Grout. Rocks and earth, in moist woods.  
*\*Bryhnia graminicolor* (Brid.) Grout. Rocks and earth, in moist woods.  
*\*Oxyrrhynchium hians* (Hedw.) Loesk. Soil in moist woods or old fields.  
*Rhynchostegium serrulatum* (Hedw.) Jaeger. Leaf-humus or rotten logs, in woods.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW AGAVE OF SOUTHERN ARIZONA.

BY ROBERT H. PEEBLES.

---

One of the most widely distributed and best known Agaves of southern Arizona is *A. palmeri* Engelm. This species shows considerable variation, but one of the forms that has passed under the name *palmeri* is so strikingly different from the typical form of the species that the writer ventures to describe it as a new species.

***Agave chrysantha*, sp. nov.**

Planta solitaria, acaulescens; folia elongata lineari-lanceolata, margine carnosu, ad apicem cornea, spinis recurvatis vel flexuosis praedita, spina terminali tenui tereti infra non profunde canaliculata, decurrente; scapus procerus, bracteis anguste triangularibus acutissimis instructus, paniculae ramis patentibus aliquantum complanatis; flores dense aggregati, pedicellis brevibus parum tenuibus; perianthium cylindraceo-urceolatum, segmentis oblongis obtusis aureis; filamenta lutea, prope medium tubi inserta; capsulae anguste obovatae breviter rostratae et stipitatae; semina parva, nigra, non nitida.

Characters not stated in the Latin diagnosis are as follows: Leaves 40 to 100, rigid, straight or slightly curved or twisted, gray green, smooth, sometimes a little narrowed below the middle, 40 to 85 cm. long, or occasionally much longer, 5 to 12 cm. wide, acuminate, strongly concave except at base where swollen and plano-convex, varying in thickness from 5 mm. near the middle to 4.5 cm. near the base; end spine reddish-brown and glossy or gray and dull, 4 to 5 cm. long, 4 to 5 mm. in diameter at base, the horny tissue decurrent on the leaf margin to the upper lateral spines, forming a naked acumination 10 to 20 cm. in length, the fleshy, undulate or straight margin with spines reddish-brown or gray below, diverse in size, mostly 10 mm. long and 2.5 to 3.0 cm. apart, at the base of the leaf rudimentary and only 1 cm. apart. Scape 4.5 to 8.0 meters high, the bracts gray, up to 18 cm. long, terminating in a reddish-brown, subulate spine. Panicle with lateral branches 15 to 40 cm. long. Flowers 4.0 to 4.5 cm. long, 100 to 300 in dense clusters sometimes 30 cm. broad. Perianth funnelform in dried flowers, tube 8 mm. deep, 8 mm. in diameter, the

segments 10 mm. long, 4 mm. broad, hooded, comose, "deep chrome"<sup>1</sup> above, paler below, the outer ones slightly broader at base and more strongly hooded than the inner, the inner segments with a high, lanceolate, acute dorsal ridge 3 mm. broad at base and extending from base of tube nearly to apex of segment. Filaments flattened, finally 3 cm. long, pale orange-yellow. Anthers "empire yellow,"<sup>2</sup> 12 to 17 mm. long. Style pale orange-yellow, 1.5 mm. in diameter, at anthesis equalling the perianth, finally 4 cm. long. Stigma 2.5 mm. in diameter. Ovary 2 to 2.5 cm. high, 4 to 6 mm. in diameter, pale green. Capsules 2.7 to 3.7 cm. long, 1.3 to 1.7 cm. in diameter, on pedicels 4 to 6 mm. long. Seeds dull black, 3.5 mm. long, 5 mm. wide.

TYPE LOCALITY: Queen Canyon, Pinal Mountains, Arizona. Type in the U. S. National Herbarium, no. 1,624,655, a flowering specimen collected by R. H. Peebles and G. J. Harrison (no. 5543), June 21, 1928. Leaf and fruit are represented by *Peebles* no. 7940, collected at the same place, July 16, 1931.

GEOGRAPHICAL DISTRIBUTION: Southern central Arizona, in the Pinal and Santa Catalina Mountains, commonly at elevations of 1,000 to 1,800 meters.

When in flower *A. chrysantha* is a striking and attractive feature of its native mountains. It is especially fine and abundant in the canyons above Superior, Pinal County. The golden-yellow flowers are copiously nectariferous and emit a strong odor resembling that of coconut meat. Reproduction is by means of the numerous and highly fertile seeds and by offsets, rarely by bulbils developed in abnormal flower clusters.<sup>3</sup>

This species has been known for many years as a yellow-flowered form of its close relative, *A. palmeri* Engelm., from which it may be distinguished, however, by the color of the flowers, the densely crowded flower and fruit clusters, the shorter and relatively broader capsules, and the more widely spaced lateral spines of the leaves. *A. chrysantha* has not been found within the range of the purple-flowered *A. palmeri*, which the writer has collected in the Pinaleno, Patagonia, and Santa Rita Mountains, nor has the latter been seen within the range of *A. chrysantha*.

A colony of extremely variable forms of *Agave* grows along Chimney Creek, at the southern base of the Rincon Mountains. These plants are more nearly related to *A. palmeri*, but the flowers range in color from dark purple to pale yellow and exhibit many other variations. This diversity and the intermediate nature of some of the characters suggest hybridization between *A. palmeri* and *A. chrysantha*, but neither of these species has been observed, in typical form, at this station.

<sup>1</sup>Ridgway, Robert. Color Standards and Color Nomenclature. 1912, pl. III.

<sup>2</sup>Ridgway, *ibid.* pl. IV.

<sup>3</sup>Gibson, Fred. Desert Plant Life, November, 1932.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW BROWN MOUSE OF THE GENUS *SCOTINOMYS*  
FROM MEXICO.

BY E. A. GOLDMAN.

---

The small *Akodon*-like mice of the genus *Scotinomys* form one of the groups characterizing the faunal subdivision known as the Central American Subregion. A single specimen from Ocuilapa, western Chiapas, collected many years ago was provisionally referred to *Scotinomys teguina* Alston, from Coban, Alta Verapaz, Guatemala, of which no typical material was available for study. On the recent Leon Mandel Guatemala Expedition, however, three topotypes of this little known species taken for the Field Museum of Natural History afford a satisfactory basis for the determination of characters. Comparisons now indicate that the Chiapas animal represents a new subspecies which is here described. For the opportunity to examine the topotypes of *S. teguina* I am grateful to Dr. W. H. Osgood and Mr. C. C. Sanborn of the Field Museum of Natural History.

*Scotinomys teguina subnubilus*, subsp. nov.

CHIAPAS BROWN MOUSE.

*Type*.—From Ocuilapa, 10 miles northwest of Ocozucua and about 25 miles west of Tuxtla Gutierrez, Chiapas, Mexico (altitude 3,500 feet); No. 76353, ♂ adult, skin and skull, U. S. National Museum (Biological Survey Collection); collected by Nelson and Goldman, August 22, 1895; original number 8371.

*Distribution*.—Known only from the type locality—in the Chiapas River Valley, western Chiapas; probably intergrading to the eastward with *Scotinomys teguina teguina*.

*General characters*.—Similar to *S. t. teguina* of Coban, Alta Verapaz, Guatemala, but smaller; color darker; skull more slender and differing in detail. Similar in size to *Scotinomys teguina irazu*, but decidedly darker, and cranial characters distinctive.



*Color.*—*Type*: Upper parts in general blackish, finely and inconspicuously mixed with rusty, producing a blackish brown effect except on the rump where the black is strongly predominant; under parts overlaid with cinnamon (Ridgway, 1912), the basal tone near slate color; forearms and thighs blackish; ears thinly clothed with blackish hairs; feet and tail all around dusky.

*Skull.*—Very similar to that of *S. t. teguina* but lighter in general structure; rostrum narrower and slightly shallower; nasals extending slightly farther posteriorly between premaxillae; zygomatic plate narrower; incisive foramina less extended posteriorly (ending in anterior plane of first upper molars instead of passing beyond this plane as in *teguina*); dentition about the same. Size and general form about as in *S. t. irazu*, but frontal region less depressed near the median line anteriorly; maxillary arm of zygoma broader near line of contact with frontals (as viewed from above); nasals longer, extending farther posteriorly beyond ends of premaxillae; supraoccipital projecting farther posteriorly over foramen magnum.

*Measurements.*—*Type*: Total length, 120 mm.; tail vertebrae, 49; hind foot, 19. Average of three adult topotypes of *S. t. teguina* used for comparison: 133 (131–138); 55 (52–58); 18.3 (18–19). *Skull* (type): Greatest length, 20.8; condylobasal length, 20; greatest breadth of braincase (across parietals), 10.5; zygomatic breadth, 11.3; interorbital constriction, 4.4; length of nasals, 8.7; length of incisive foramina, 3.7; length of palatal bridge, 4.2; maxillary toothrow (alveoli), 3.8.

*Remarks.*—The known forms of *Scotinomys* are all closely allied and probably referable to a single species. The recording of *S. t. subnubilis* extends the known range of the genus west into southern Mexico. The new form, based on a single specimen, is distinguished from *Scotinomys teguina rufoniger* recently described by Sanborn from the mountains west of San Pedro, northwestern Honduras, by smaller size and more delicate structure. It appears to have a range at a lower elevation (3,500 feet) than has hitherto been recorded for the genus which, represented by *S. xerampelinus* on the Volcan de Chiriqui, western Panama, reaches an altitude of 10,300 feet.

PROCEEDINGS  
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A NEW WEASEL FROM PERU.<sup>1</sup>

BY E. RAYMOND HALL.

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Study of the South American weasels of the genus *Mustela* has revealed the existence there of one heretofore undescribed geographic race. This long-tailed weasel, of the lower, eastern slopes of the Andes, together with other kinds described from the Andes, belongs to the species *Mustela frenata*. The five specimens examined of the new race, kindly made available for study by Dr. W. H. Osgood and Mr. C. C. Sanborn, were taken by Mr. Edmund Heller for the Field Museum of Natural History, and it is in recognition of the latter's contributions to mammalogy that the name *helleri* is proposed for the new form.

Color terminology, unless otherwise indicated, is that of Ridgway: Color Standards and Color Nomenclature, 1912. Linear measurements are in millimeters and weights are in grams.

***Mustela frenata helleri*, new subspecies.**

*Type*.—Male, adult, skull and skin; no. 24133, Field Mus. Nat. Hist.; 3000 feet, Hacienda San Antonio, Rio Chinchao, Peru; August 2, 1922; collected by Edmund Heller; original no. 6589.

*Range*.—Altitudinally 3000 feet (type locality) to 6700 feet (Ambo), Tropical and Subtropical zones of eastern Peru.

*Diagnosis*.—Size: Medium (see measurements). Color: Rarely few white hairs anterior to each ear and sometimes posterior one-fifth of each upper lip white; top of head, posteriorly to slightly behind ears, black, grading insensibly into color of upperparts of body; dark spots at angles of mouth absent; tip of tail black; remainder of upperparts near (*n*) argus brown and tone 3 of carbon brown, pl. 342 of Oberthür and Dauthenay (*Répertoire de Couleurs*, 1905); chin whitish; remainder of underparts warm buff; color of underparts extends distally on posterior sides of fore limbs

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<sup>1</sup>Contribution from the Museum of Vertebrate Zoology, University of California.

to wrists but not reaching foot soles, and on hind limbs to slightly below knees; least width of color of underparts 24 per cent of greatest width of color of upperparts in each of two males and 19 to 30 per cent in three females. Black tip of tail longer than hind foot and averaging 40 (39-42) per cent of length of tail. Skull and teeth: Male: See measurements; weight, 4.5 (4.2-4.8) grams; basilar length, 44.6 (44.0-45.3); zygomatic breadth more than distance between condylar foramen and  $M^1$  or than between anterior palatine foramen and anterior margin of tympanic bulla; mastoid breadth more or less than postpalatal length; postorbital breadth more than combined length of upper premolars and greater than width of basioccipital, measured from medial margin of one foramen lacerum posterior to its opposite; interorbital breadth more than distance between foramen opticum and anterior margin of tympanic bulla; breadth of rostrum more or less than length of tympanic bulla; least width of palate more than inside length of  $P^4$ ; anterior margin of tympanic bulla as far posterior to foramen ovale as combined width of 4 (including  $I^3$ ) upper incisors; height of tympanic bulla less than distance from its anterior margin to foramen ovale; length of tympanic bulla more than length of lower molar and premolar tooth-row and less than length of rostrum; anterior margin of masseteric fossa posterior to  $M_2$  by length of that tooth. Female (one from Ambo and one from Huanuco): See measurements; weight, 1.7 (1.5-1.9) grams; basilar length, 36.5 (35.3-38.1); zygomatic breadth less than distance between condylar foramen and  $M^1$  or than distance between anterior palatine foramen and anterior margin of tympanic bulla; postorbital breadth more than combined alveolar length of upper premolars or than width of basioccipital measured from medial margin of one foramen lacerum posterior to its opposite; least width of palate more or less than outside length of  $P^4$ ; tympanic bulla as far posterior to foramen ovale as combined width of at least  $5\frac{1}{2}$  upper incisors; height of tympanic bulla less than distance from its anterior margin to foramen ovale; length of tympanic bulla more than length of lower molar and premolar tooth-row and less than length of rostrum.

The skulls of females average 62 per cent lighter than those of the males.

Compared with the skull of male *macrura*, that of *helleri* has a greater mastoid breadth and notably larger teeth. The skull is deeper and averages heavier throughout. *M. f. helleri* is a much darker colored animal than *macrura*.

*Remarks.*—This subspecies is insufficiently known, especially as to range. Doubtless it occupies a considerable range in the Tropical Zone along the eastern base of the Andes. The three females, two from Ambo and one from Huanuco, almost certainly are not typical. They come from a much higher altitude than do the two males, where the climate is said to be much more arid than at the type locality. The difference in weight between the skulls of the two sexes, 62 per cent, is greater than in any other subspecies of South American weasel and suggests that the females may even belong to a subspecies distinct from that represented by the males.

The type specimen has a broad skull with major proportions strikingly like those of *Mustela stolzmanni*. Possibly the similar climatic conditions

under which the two live have left their impress in similar fashion on this part of each of the two forms. The teeth, tympanic bullae, and certain other parts of the skull are, however, so differently proportioned as to show that the skulls pertain to distinct species. The referred male from 3500 feet on the Rio Chinchao has a much longer skull than the type specimen and the relative proportions of breadth and depth of the two skulls vary widely. Judging from large series of weasels examined from localities outside the range of *helleri*, the two skulls represent, within the species *Mustela frenata*, almost the maximum of individual variation occurring in one subspecies.

*Specimens examined*.—Total number, 5, all from Peru, as follows: 3000 ft., Hacienda San Antonio, Rio Chinchao, 1; 3500 ft., Hacienda Buena Vista, Rio Chinchao, 1; Huanuco, 1; Ambo, 2.

## MEASUREMENTS.

|                                                                                     | ♂ <i>ad. type</i> . | ♂ <i>ad. no. 24132, Rio Chinchao, Peru.</i> | ♀ <i>ad. 24136, Huanuco, Peru.</i> | ♀ <i>ad. 24135, Ambo, Peru.</i> | ♀ <i>ad. 24134, Ambo, Peru.</i> |
|-------------------------------------------------------------------------------------|---------------------|---------------------------------------------|------------------------------------|---------------------------------|---------------------------------|
| Total length.....                                                                   | 382                 | 418                                         | 303                                | ....                            | 328                             |
| Length of tail.....                                                                 | 152                 | 164                                         | 103                                | ....                            | 118                             |
| Length of hindfoot.....                                                             | 52                  | 48                                          | 39                                 | ....                            | 39                              |
| Basilar length.....                                                                 | 44.0                | 45.3                                        | 35.3                               | 36.1                            | 38.1                            |
| Length of upper tooth-rows.....                                                     | 16.4                | 17.0                                        | 13.0                               | 13.8                            | 14.0                            |
| Breadth of rostrum across lacrimal processes.....                                   | 14.5                | 13.9                                        | 10.5                               | 10.9                            | 10.6                            |
| Interorbital breadth.....                                                           | 12.5                | 11.7                                        | 8.9                                | 9.0                             | 9.1                             |
| Orbitonasal length <sup>1</sup> .....                                               | 14.9                | 15.5                                        | 12.1                               | 12.4                            | 12.6                            |
| Mastoid breadth.....                                                                | 24.5                | 24.5                                        | 17.9                               | 18.8                            | 19.8                            |
| Zygomatic breadth.....                                                              | 29.1                | 29.0                                        | 20.8                               | 22.4                            | 22.2                            |
| Tympanic bulla { length.....                                                        | 14.4                | 14.4                                        | 11.8                               | 11.8                            | 12.0                            |
| { breadth.....                                                                      | 6.5                 | 6.5                                         | 4.7                                | 5.0                             | 5.4                             |
| { depth.....                                                                        | 2.4                 | 2.4                                         | 2.0                                | 1.9                             | 2.0                             |
| Depth of skull at anterior border of basioccipital exclusive of sagittal crest..... | 16.0                | 16.0                                        | 11.8                               | 12.6                            | 13.9                            |
| Depth of skull at posterior borders of upper molars.....                            | 14.0                | 13.7                                        | 10.0                               | 10.5                            | 11.0                            |

<sup>1</sup>From posterior margin of postorbital process of frontal to superior border of anterior nares.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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THREE NEW FORMS OF BIRDS FROM THE  
PHILIPPINE ISLANDS AND SIAM.

BY J. H. RILEY.<sup>1</sup>

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In identifying the birds collected in Siam by Dr. Hugh M. Smith, I have reached the conclusion that the three following forms are unnamed. Two are from the Philippine Islands and one from eastern Siam. They may be known from the following descriptions:

***Riparia chinensis tantilla*, subsp. nov.**

*Type*.—Adult male, U. S. National Museum number 210,794, Laoag River (below Padsan), Ilocos Norte, Luzon, Philippine Islands, January 18, 1907. Collected by Dr. E. A. Mearns (original number 14693).

Similar to *Riparia chinensis chinensis* Gray, but darker above, especially on the pileum and rump; wing 90; tail 39; culmen 6.

*Remarks*.—This form is founded upon three males and one female, the type from below Padsan and the other three from Laoag, localities one day apart. These have been compared with one male and one female from Mae Hiek, Burma, and one male and two females from Hang Tum Kai, Siam, collected by Dr. Hugh M. Smith. The latter locality in northern Siam is close to Mae Hiek, which is just over the boundary in Burma. The small series from Luzon is fairly uniform and differs from the Burma-Siam series above as described; below the two series are practically alike, though even here the Philippine form averages slightly darker. There is little or no difference in size. The four specimens from the Philippines measure: wing 83-90 (86.9); tail 35-39 (36.7); culmen 5-6 (5.7). The five specimens from Burma and Siam measure: wing 84-91 (87.9); tail 37-40 (38.8); culmen 6-6.5 (6.1).

***Orthotomus cineraceus cagayanensis*, subsp. nov.**

*Type*.—Adult male, U. S. National Museum number 210,844, Cagayan Sulu Island, Philippine Islands, October 15, 1906. Collected by Dr. E. A. Mearns (original number 14,432).

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<sup>1</sup>Published by permission of the Secretary of the Smithsonian Institution.



Similar to *Orthotomus cineraceus cineraceus* Blyth, but darker, both above and below; the back with a brownish wash; the wing coverts edged with rufescent brown; the head a deeper brown (near burnt sienna), extending back over the nape. Wing 48; tail 25; culmen 15 mm.

*Remarks.*—This race is founded upon a single specimen. I have had for comparison two specimens from Peninsular Siam, one from Billiton, and three from Banka of *Orthotomus cineraceus cineraceus*, and five specimens from Borneo of *Orthotomus cineraceus borneoensis*, none of which the above specimen matches. In fact, it differs more pronouncedly from the latter than the mainland form does from that of Borneo. The pileum in the mainland form and that of Borneo is gray or brownish gray, while in *cagayanensis* the burnt sienna of the forehead extends back over the nape, only tinged posteriorly with a deeper brown.

I have reached the conclusion that *cineraceus* does not belong to the *Orthotomus sepium* form group at all. The latter is grayish olive above, light yellow below, washed with gray on the sides and chest, only the lower throat dark gray, quite different from the neutral gray of *cineraceus*.

Both species have been taken in Java.

***Piprisoma modesta pallescens*, subsp. nov.**

*Type.*—Adult female, U. S. National Museum number 324,673, Pak Chong, Siam, November 26, 1929. Collected by Dr. Hugh M. Smith, original number 3514.

Similar to *Piprisoma modesta modesta* (Hume) from the Malay Peninsula, but paler and more grayish above; more whitish below, the streaks narrower; the under tail coverts much paler. Wing 59; tail 29; culmen 8.

*Remarks.*—The present form is founded upon three females from eastern Siam compared with two males and one female from Trang, Peninsular Siam. The sexes in this species are alike. When the two series are compared, the differences stand out as described above. There is probably little or no difference in size.

PROCEEDINGS  
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TWO NEW POCKET GOPHERS OF THE  
GENUS THOMOMYS.

BY E. A. GOLDMAN.

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Continued studies of the pocket gophers of the genus *Thomomys* have resulted in the segregation of two geographic races hitherto included in the general range of *Thomomys bottae toltecus*. For the loan of the type and topotypes of the subspecies mentioned, for comparison in this connection, I am indebted to Dr. H. E. Anthony, American Museum of Natural History.

***Thomomys bottae extenuatus*, subsp. nov.**

SULPHUR SPRINGS VALLEY POCKET GOPHER.

*Type*.—From Willcox, Cochise County, Arizona (altitude 4,000 feet). No. 17872/24809. ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection); collected by Vernon Bailey, November 27, 1889. Original number 712.

*Distribution*.—Desert plains of the Sulphur Springs Valley and adjoining territory, in southeastern Arizona.

*General characters*.—A small, rather dull buffy subspecies; mammae, pectoral two pairs, inguinal two pairs. About like *Thomomys bottae toltecus* of the Casas Grandes River Valley, northwestern Chihuahua, in color, but smaller, and cranial characters distinctive. Similar to *Thomomys bottae modicus* of the Altar Valley region, Pima County, Arizona, but general color near cinnamon buff, instead of wood brown, and cranial details different. Compared with *Thomomys bottae mutabilis* of the Verde River Valley, Arizona: Smaller, and much duller in color, combined with differential cranial features.

*Color*.—*Type* (nearly full winter pelage): Upper parts in general near cinnamon buff (Ridgway, 1912), thinly mixed with black on head and over back; forearms and thighs near light ochraceous buff; under parts overlaid with light buff; muzzle blackish; ears encircled by black; feet white; tail nearly unicolor, thinly clothed with whitish hairs.

*Skull*.—Similar to that of *T. b. toltecus*, but smaller; basioccipital narrower;

audital bullae more fully inflated, bulging farther below level of basi-occipital; upper incisors usually more strongly decurved (usually more procumbent in *toltecus*). Not very unlike that of *T. b. modicus*, but smaller; rostrum relatively broader, less constricted at point of union between maxillae and premaxillae, as viewed from above; nasals broader, less wedge-shaped posteriorly, the sides therefore more nearly parallel; bullae usually more fully inflated; dentition about the same. Differing from that of *T. b. mutabilis* mainly in smaller general size, combined with larger audital bullae.

*Measurements.*—*Type*: Total length, 203 mm.; tail, 67; hind foot, 27.5. An adult female topotype: 198; 67; 29. *Skull* (type): Occipitonasal length, 36.5; zygomatic breadth, 22.5; breadth across squamosals (over mastoids), 20; interorbital constriction, 7.2; length of nasals, 11.8; maxillary toothrow (alveoli), 7.5.

*Remarks.*—The range of *T. b. extenuatus* is restricted mainly to the desert plains of the Sulphur Springs Valley, which form a somewhat isolated interior basin near the top of the continental divide.

*Specimens examined.*—Total number, 11, all from Arizona as follows: Dos Cabezas, 1; Fort Bowie (near west base of Chiricahua Mountains), 6; Fort Grant, 2; Willcox (type locality), 2.

### ***Thomomys bottae opulentus*, subsp. nov.**

TAWNY POCKET GOPHER.

*Type.*—From Las Palomas, on the Rio Grande, Sierra County, New Mexico. No. 167318, ♀ adult, skin and skull, U. S. National Museum (Biological Survey collection); collected by E. A. Goldman, October 24, 1909. Original number 20675.

*Distribution.*—Rio Grande Valley from Socorro south at least to Las Cruces, southwestern New Mexico.

*General characters.*—A rather large, rich ochraceous tawny subspecies, with a moderately heavy skull; upper incisors strongly decurved; mammae, pectoral two pairs, inguinal two pairs. Similar to *Thomomys bottae toltecus* of the Casas Grandes River Valley, northwestern Chihuahua, but color richer, nearer ochraceous tawny, and cranial characters distinctive. Size about as in *Thomomys bottae fulvus* of the Mogollon Plateau region of Arizona, but colors lighter, the back less heavily overlaid with black; cranial features also divergent. Differing from *Thomomys bottae ruidosae* of Ruidoso, New Mexico, in larger size, richer, more rufescent coloration, and cranial details.

*Color.*—*Type* (nearly full winter pelage): Upper parts between tawny and ochraceous tawny (Ridgway, 1912), purest on shoulders and along upper part of sides, the head and median dorsal area thinly overlaid with black; forearms, lower part of sides, and thighs ochraceous buff; under parts overlaid with light ochraceous buff; ears narrowly encircled with black; feet white; tail thinly clothed with fine buffy white hairs, with a trace of brown above, becoming naked near tip.

*Skull.*—Similar to that of *T. b. toltecus* but more elevated in upper profile

across anterior roots of zygomata, the rostrum more depressed and sloping more strongly downward anteriorly; audital bullae about the same; upper incisors usually shorter, more strongly decurved, the ends tending to recurve (upper incisors somewhat procumbent in *toltecus*). Not very different from *T. b. fulvus* in general size and form, but averaging somewhat heavier; zygomata less strongly bowed outward posteriorly, the sides more nearly parallel; rostrum usually more depressed anteriorly; audital bullae slightly larger; upper incisors more recurved. Compared with that of *T. b. ruidosae* the skull is decidedly larger, more massive, and differs otherwise in about the same characters as from *fulvus*.

*Measurements*.—*Type*: Total length, 234 mm.; tail, 76; hind foot, 33. An adult male from Garfield, New Mexico: 238; 74; 32.5. *Skull* (type): Occipitonasal length, 40.7; zygomatic breadth, 25.3; breadth across squamosals (over mastoids), 21.1; interorbital constriction, 7; length of nasals, 13.9; maxillary toothrow (alveoli), 7.8.

*Remarks*.—Typical *T. b. opulentus* is readily distinguished from any of its geographic neighbors by rich, light tawny coloration. Specimens from Socorro and San Marcial are very variable in color, some of the darker individuals exhibiting gradation toward the darker subspecies *T. b. fulvus* and *T. b. ruidosae*, which range in that region to the west and east of the Rio Grande Valley, respectively. Although nearer to *opulentus*, specimens from this section apparently form the most direct connection between *fulvus* and *ruidosae*.

*Specimens examined*.—Total number, 31, all from New Mexico as follows: Cuchillo, 1; Garfield, 5; Lake Valley, 2; Las Cruces, 1; Las Palomas (type locality), 2; San Marcial, 4; Socorro, 16.



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POCKET GOPHERS OF THE *THOMOMYS BOTTAE*  
GROUP IN THE UNITED STATES.

BY E. A. GOLDMAN.

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In revising the pocket gophers of the genus *Thomomys*, Bailey (North Amer. Fauna No. 39, p. 33, Nov. 15, 1915) assigned numerous species and subspecies in the southwestern United States to the "*bottae*," "*perpallidus*," and "*fulvus*" groups, respectively, which he indicated are "not sharply separated." The writer in describing new forms from Arizona (Journ. Wash. Acad. Sci., vol. 21, no. 17, p. 416, Oct. 19, 1931) stated that these "groups" are united by forms so closely interrelated that even specific distinction disappears. The Colorado River and its canyons are effective barriers limiting the distribution of pocket gophers until the stream enters the flood plain near its mouth, where, as I also pointed out, shifting channels would naturally result in the transfer of colonies from one side to the other. Some specimens from the opposing sides of the lower part of the river valley are indistinguishable, and intergradation in characters across this section may be regarded as complete. Further study confirms the conclusion forecasted, that all of the closely allied forms currently regarded as geographic races of *perpallidus* and *fulvus* should be listed as subspecies of *bottae*, an older name. Complete intergradation may not be demonstrable in all cases at the present time, but trinomial names seem warranted for forms that exhibit a very close approach in all essential characters, including those known to be of sub-specific value elsewhere, and topography indicates that ranges are probably confluent.

*Thomomys bottae* as now understood, therefore, embraces an extraordinary number of widely dispersed but closely interrelated subspecies. The



general range of the species is from California north to southwestern Oregon; east through southern Nevada and Utah to the Upper Arkansas River Valley, Colorado; south nearly throughout Lower California, Arizona, New Mexico, western Texas; and on the Mexican mainland to northern Durango and central Sinaloa. While the multiplicity of forms appears to be the expression of environmental factors and the sedentary habits of these animals, the more salient characters linking all forms are maintained with remarkable constancy throughout the series.

The term "*bottae* group" is here used in a somewhat restricted sense. Only two forms, evidently offshoots of the *bottae* series, are included with full specific rank. *Thomomys lachugilla* may prove to intergrade with *bottae*; and the group position of *Thomomys baileyi* is not remote.

The Mexican mainland forms of *Thomomys bottae* have been treated by Nelson and Goldman (Journ. Mamm., vol. 15, no. 2, pp. 121-124, May 15, 1934). Those that occur in Lower California have been correctly allocated, with the exception of *Thomomys martirensis* of the San Pedro Martir Mountains (8,200 feet), which should be recognized as *Thomomys bottae martirensis*. The present paper, revising names, is an attempt to substitute order for a chaotic nomenclatural condition for which the writer has been partly responsible.

#### LIST OF SPECIES AND SUBSPECIES WITH TYPE LOCALITIES.

- Thomomys bottae bottae* (Eydoux and Gervais). "Coast of California," probably vicinity of Monterey.
- Thomomys bottae minor* Bailey. Fort Bragg, Mendocino County, California.
- Thomomys bottae laticeps* Baird. Humboldt Bay, California.
- Thomomys bottae saxatilis* Grinnell. Susanville (4,400 feet), Lassen County, California.
- Thomomys bottae leucodon* Merriam. Grants Pass, Rogue River Valley, Oregon.
- Thomomys bottae navus* Merriam. Red Bluff, Tehama County, California.
- Thomomys bottae mewa* Merriam. Raymond, Madera County, California.
- Thomomys bottae awahnee* Merriam. Yosemite Valley (4,000 feet), Mariposa County, California.
- Thomomys bottae alpinus* Merriam. Big Cottonwood Meadows, 8 miles southeast of Mount Whitney (10,000 feet), Sierra Nevada, Tulare County, California.
- Thomomys bottae pascalis* Merriam. Fresno, San Joaquin Valley, California.
- Thomomys bottae angularis* Bailey. Los Baños, Merced County, California.
- Thomomys bottae ingens* Grinnell. East side levee (2 miles west of Millux), Buena Vista Lake (290 feet), Kern County, California.
- Thomomys bottae diaboli* Grinnell. Sweeney's Ranch, 22 miles southwest of Los Baños, Merced County, California.
- Thomomys bottae infrapallidus* Grinnell. Seven miles southeast of Simmler, Carrizo Plain, San Luis Obispo County, California.
- Thomomys bottae pallescens* Rhoads. Grapeland, San Bernardino County, California.

- Thomomys bottae altirallis* Rhoads. San Bernardino Mountains (5,000 feet), California.
- Thomomys bottae neglectus* Bailey. Bear Flat Meadows (6,400 feet), San Antonio Peak, San Gabriel Mountains, California.
- Thomomys bottae nigricans* Rhoads. Witch Creek, San Diego County, California.
- Thomomys bottae puertae* Grinnell. Mason's Ranch, La Puerta Valley, San Diego County, California.
- Thomomys bottae jacinteus* Grinnell and Swarth. Round Valley (9,000 feet), San Jacinto Mountains, Riverside County, California.
- Thomomys bottae cabezonae* Merriam. Cabezon, San Geronio Pass, California.
- Thomomys bottae perpallidus* Merriam. Palm Springs, Riverside County, California.
- Thomomys bottae albatus* Grinnell. West side of Colorado River at Old Hanlon Ranch, near Pilot Knob, California.
- Thomomys bottae mohavensis* Grinnell. Mohave River bottom (2,700 feet), near Victorville, California.
- Thomomys bottae amargosae* Grinnell. Shoshone (1,560 feet), Amargosa River, Inyo County, California.
- Thomomys bottae perpes* Merriam. Lone Pine, Owens Valley, California.
- Thomomys bottae scapterus* Elliot. Hannopec Canyon, Panamint Mountains, California.
- Thomomys bottae melanotis* Grinnell. Big Prospector Meadow (10,500 feet), White Mountains, California.
- Thomomys bottae argusensis* Huey. Junction Ranch, Argus Mountains, California.
- Thomomys bottae operarius* Merriam. Keeler, Owens Lake, Inyo County, California.
- Thomomys bottae oreoecus* Burt. Greenwater (4,300 feet), Black Mountains, 8 miles southwest of Ryan, Inyo County, California.
- Thomomys bottae providentialis* Grinnell. Purdy (4,500 feet), 6 miles southeast of New York Mountain, Providence Range, San Bernardino County, California.
- Thomomys bottae canus* Bailey. Deep Hole, north end of Smoke Creek Desert, Washoe County, Nevada.
- Thomomys bottae depressus* Hall. Dixie Meadows (3,500 feet), Churchill County, Nevada.
- Thomomys bottae cinereus* Hall. West Walker River, Smiths Valley (4,700 feet), Lyon County, Nevada.
- Thomomys bottae lachrymalis* Hall. Arlemont (Chiatovich Ranch), Fish Lake Valley (4,900 feet), Esmeralda County, Nevada.
- Thomomys bottae solitarius* Grinnell. Finger-rock Wash, Stewart Valley (5,400 feet), Mineral County, Nevada.
- Thomomys bottae fumosus* Hall. Milman Ranch, Moores Creek, 19 miles southeast of Millett P. O., Nye County, Nevada.
- Thomomys bottae curtatus* Hall. San Antonio (5,400 feet), Nye County, Nevada.

- Thomomys bottae vescus* Hall and Davis. South slope Mount Jefferson (9,000 feet), Toquema Range, Nye County, Nevada.
- Thomomys bottae conciser* Hall and Davis. Monitor Valley (Potts Ranch, 6,900 feet), Nye County, Nevada.
- Thomomys bottae abstrusus* Hall and Davis. Fish Spring Valley (2 miles southeast Tulle Peak, 7,000 feet), Nye County, Nevada.
- Thomomys bottae brevidens* Hall, Breen Creek (7,000 feet), Kawich Range, Nye County, Nevada.
- Thomomys bottae latus* Hall and Davis. Cherry Creek (6,500 feet), White Pine County, Nevada.
- Thomomys bottae centralis* Hall. Two and one-half miles east of Baker (5,700 feet), White Pine County, Nevada.
- Thomomys bottae nanus* Hall. South end of Belted Range, 5½ miles northwest of Whiterock Spring (7,200 feet), Nye County, Nevada.
- Thomomys bottae phelleoecus* Burt. Hidden Forest (8,500 feet), Sheep Mountains, Clark County, Nevada.
- Thomomys bottae aureiventris* Hall. Kelton (4,225 feet), Box Elder County, Utah.
- Thomomys bottae albicaudatus* Hall. Provo (4,510 feet), Utah County, Utah.
- Thomomys bottae planirostris* Burt. Zion National Park, Washington County, Utah.
- Thomomys bottae osgoodi* Goldman. Hanksville, Wayne County, Utah.
- Thomomys bottae dissimilis* Goldman. East slope of Mount Ellen (8,000 feet), Henry Mountains, Garfield County, Utah.
- Thomomys bottae aureus* Allen. Bluff, San Juan County, Utah.
- Synonym*—*Thomomys latirostris* Merriam. Little Colorado River, Painted Desert, Coconino County, Arizona.
- Thomomys bottae absonus* Goldman. Jacobs Pools (4,000 feet), Houserock Valley, Coconino County, Arizona.
- Thomomys bottae trumbullensis* Hall and Davis. Three miles south of Nixon Spring, Mount Trumbull, Mohave County, Arizona.
- Thomomys bottae fulvus* (Woodhouse). San Francisco Mountain, Coconino County, Arizona.
- Synonym*—*Thomomys bottae nasutus* Hall. West Fork of Black River (7,550 feet), Apache County, Arizona.
- Thomomys bottae desertorum* Merriam. Mud Spring, Detrital Valley, Mohave County, Arizona.
- Thomomys bottae mutabilis* Goldman. Camp Verde (3,200 feet), Yavapai County, Arizona.
- Thomomys bottae subsimilis* Goldman. Harquahala Mountains (3,000 feet), Yuma County, Arizona.
- Thomomys bottae chrysonotus* Grinnell. Ehrenberg, Yuma County, Arizona.
- Synonym*—*Thomomys fulvus flavidus* Goldman. Parker (350 feet), Yuma County, Arizona.
- Thomomys bottae cervinus* Allen. Phoenix, Maricopa County, Arizona.
- Thomomys bottae modicus* Goldman. La Osa, southern end of Altar Valley, Pima County, Arizona.

- Thomomys bottae phasma* Goldman. Two miles south of Tule Tank, Tule Desert, Yuma County, Arizona.
- Thomomys bottae catalinae* Goldman. Summerhaven (7,500 feet), Santa Catalina Mountains, Arizona.
- Thomomys bottae grahamensis* Goldman. Graham Mountains (9,200 feet), Graham County, Arizona.
- Thomomys bottae collinus* Goldman. Fly Park (9,000 feet), Chiricahua Mountains, Cochise County, Arizona.
- Thomomys bottae pusillus* Goldman. Coyote Mountains (3,000 feet), Pima County, Arizona.
- Thomomys bottae peramplus* Goldman. Wheatfield Creek (7,000 feet), west slope of Tunicha Mountains, Apache County, Arizona.
- Thomomys bottae extenuatus* Goldman. Willcox (4,000 feet), Cochise County, Arizona.
- Thomomys bottae toltecus* Allen. Colonia Juarez (4,500 feet), Casas Grandes River, Chihuahua, Mexico.
- Thomomys bottae apache* Bailey. Lake La Jara (7,500 feet), Jicarilla Apache Indian Reservation, New Mexico.
- Thomomys bottae pervagus* Merriam. Española, Santa Fe County, New Mexico.
- Thomomys bottae ruidosae* Hall. Ruidoso (6,700 feet), Lincoln County, New Mexico.
- Thomomys bottae opulatus* Goldman. Las Palomas, on the Rio Grande, Sierra County, New Mexico.
- Thomomys bottae texensis* Bailey. Head of Limpia Creek, Davis Mountains, Texas.
- Thomomys suboles* Goldman. Old Searchlight Ferry (1,000 feet), Colorado River, northwest of Kingman, Mohave County, Arizona.
- Thomomys alexandriae* Goldman. Five miles southeast of Rainbow Lodge (6,200 feet), near Navajo Mountain, Coconino County, Arizona.









PROCEEDINGS  
OF THE  
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NATURAL HISTORY OF PLUMMERS ISLAND,  
MARYLAND.

IV. BIRDS.<sup>1</sup>

BY A. K. FISHER.

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The accompanying list of 186 species and 4 additional subspecies is a synopsis taken from an extensive manuscript in which statements as to the habits and occurrence of the various species are given in detail. It includes all forms that have been reported on the property of the Washington Biologists' Field Club from the first records of the Club to October, 1935. Species that have been found nesting on the mainland property are indicated by one asterisk, and those recorded breeding on the island proper by two asterisks.<sup>2</sup>

*Gavia immer immer*, Common Loon.

Adult seen at west end of island, June 2, 1907.

*Gavia stellata*, Red-throated Loon.

One seen off island October 30, 1904.

*Colymbus auritus*, Horned Grebe.

Casual spring and autumn migrant; earliest April 14, latest October 27.

*Podilymbus podiceps podiceps*, Pied-billed Grebe.

Once seen near ferry.

*Phalacrocorax auritus auritus*, Double-crested Cormorant.

One seen at lower end of island, May 6, 1917.

*Ardea herodias herodias*, Great Blue Heron.

Ice permitting, this species may be seen any time of year. Most frequent April 1-October 14.

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<sup>1</sup>For Nos. I, II, and III of this series, see Proc. Biol. Soc. Washington, xlviii, 1935, pp. 115-137.

<sup>2</sup>Editor's Note.—The author does not concur in the nomenclature, nor, in part, in the classification followed, which has been made to conform with the fourth (latest) edition of the Check-list of North American Birds of the American Ornithologists' Union, published in 1931.

*Casmerodius albus egretta*, American Egret.

Casual, one seen July 24, 1926.

*Florida caerulea caerulea*, Little Blue Heron.

Casual in July and August.

*Butorides virescens virescens*, Eastern Green Heron.\*

Frequent April 23–September 9. June, 1906, a pair seen repeatedly at the west end of the island.

*Nycticorax nycticorax hoactli*, Black-crowned Night Heron.

Occasionally seen along river banks, April 4–November 6.

*Branta canadensis canadensis*, Common Canada Goose.

Recorded in migration flights in spring and autumn.

*Anas platyrhynchos platyrhynchos*, Common Mallard.

Casual; usually in early spring, but occasionally in fall.

*Anas rubripes tristis*, Common Black Duck.

Seen occasionally in spring, more rarely in fall.

*Dafila acuta tzitzihua*, American Pintail.

May 2, 1920, seven noted.

*Nettion carolinense*, Green-winged Teal.

October 5, 1910, about ten seen below ferry.

*Querquedula discors*, Blue-winged Teal.

May 6, 1907, a pair seen in Sycamore Cove.

*Aix sponsa*, Wood Duck.\*\*

Common summer resident, March 1–October 26, nesting at times on island. Young seen as early as May 7.

*Nyroca valisineria*, Canvas-back.

One in river at island, and a flock seen flying, February 23, 1930.

*Nyroca marila*, Greater Scaup Duck.

Three seen May 27, 1906.

*Nyroca affinis*, Lesser Scaup Duck.

Male collected April 14, 1912.

*Glaucionetta clangula americana*, American Golden-eye.

Small flocks seen in January and February, 1930.

*Charitonetta albeola*, Buffle-head.

Seen April 14 and November 10, 1912.

*Clangula hyemalis*, Old-squaw.

Adult male seen November 29, 1931.

*Lophodytes cucullatus*, Hooded Merganser.

Migrant—Spring and autumn; earliest March 19, latest November 21.

*Mergus merganser americanus*, American Merganser.

Casual. December 11 to March 19.

*Mergus serrator*, Red-breasted Merganser.

Casual. January 11–May 7.

*Cathartes aura septentrionalis*, Turkey Vulture.\*

Common resident.

*Coragyps atratus atratus*, Black Vulture.

Resident; first seen January, 1920. Gradually increasing in number.

*Accipiter velox velox*, Sharp-shinned Hawk.

Not uncommon.

*Accipiter cooperi*, Cooper's Hawk.

A number killed on property.

*Buteo borealis borealis*, Eastern Red-tailed Hawk.

Occasionally seen between August 23 and April 20.

*Buteo lineatus lineatus*, Northern Red-shouldered Hawk.\*

Not uncommon. Pair breeding west of property.

*Buteo platypterus platypterus*, Broad-winged Hawk.

Seen on four occasions, one collected.

*Haliaeetus leucocephalus leucocephalus*, Southern Bald Eagle.

Seen flying up and down river.

*Circus hudsonius*, Marsh Hawk.

Seen April 9, 1916, February 24, 1918, and March 14, 1920.

*Pandion haliaëtus carolinensis*, Osprey.

Not uncommon.

*Falco peregrinus anatum*, Duck Hawk.

Seen February 19 and 26, 1922, and in January, 1923.

*Bonasa umbellus umbellus*, Eastern Ruffed Grouse.

Formerly common, but last seen September 20, 1913.

*Colinus virginianus virginianus*, Eastern Bob-white.\*\*

Resident. Two coveys have lived on the property since it was first occupied by the Club. Small young seen.

*Phasianus colchicus torquatus*, Ring-necked Pheasant.

Three on island, October 20, 1935.

*Meleagris gallopavo silvestris*, Wild Turkey.

A flock seen on the island just before Club was established.

*Fulica americana americana*, American Coot.

One seen near ferry April 30, 1911.

*Oxyechus vociferus vociferus*, Killdeer.\*

Summer resident. February 22–October 15. Nest in cornfield, June 18, 1916.

*Squatarola squatarola*, Black-bellied Plover.

One seen October 26, 1919.

*Philohela minor*, American Woodcock.\*

Summer resident, March 10–November 25. Probably has nested on property.

*Actitis macularia*, Spotted Sandpiper.\*\*

Summer resident, April 2–October 28.

*Tringa solitaria solitaria*, Eastern Solitary Sandpiper.

Migrant, April 28–May 20, August 24–September 7.

*Totanus flavipes*, Lesser Yellow-legs.

One flying over May 5, 1935.

*Larus argentatus smithsonianus*, Herring Gull.

Casual, February 10–March 6.

*Larus delawarensis*, Ring-billed Gull.

Northward in March in large, circling flocks.

*Larus philadelphia*, Bonaparte's Gull.

Flocks were seen April 30, 1900, and March 25, 1922.

*Sterna hirundo hirundo*, Common Tern.

A flock seen May 13, 1923.

*Hydroprogne caspia imperator*, Caspian Tern.

One seen May 5, 1918.

*Chlidonias nigra surinamensis*, Black Tern.

Immature birds seen in August, 1906.

*Zenaidura macroura carolinensis*, Eastern Mourning Dove.\*\*

Common summer resident, February 6–December 24.

*Coccyzus americanus americanus*, Yellow-billed Cuckoo.\*\*

Summer resident May 3–October 7. Young seen on several occasions.

*Coccyzus erythrophthalmus*, Black-billed Cuckoo.

Migrant. May 13–24, September 7–October 5.

*Tyto alba pratincola*, Barn Owl.\*\*

Resident. Nest with seven eggs found May 3, 1928.

*Otus asio naevius*, Eastern Screech Owl.\*\*

Resident. Often seen and heard from 1905 to 1909. Not seen since 1915. Young in nest, spring, 1909.

*Bubo virginianus virginianus*, Great Horned Owl.

Resident in Virginia. Heard occasionally on island.

*Strix varia varia*, Northern Barred Owl.\*\*

Resident and breeding on island.

*Asio wilsonianus*, Long-eared Owl.

One seen March 5, 1922.

*Antrostomus vociferus vociferus*, Eastern Whip-poor-will.

Casual in summer, April 9–September 19; possibly breeding.

*Chordeiles minor minor*, Eastern Nighthawk.

Casual in summer, May 5–September 16.

*Chaetura pelagica*, Chimney Swift.\*\*

Summer resident. April 13–October 9. Nest July 5, 1908.

*Archilochus colubris*, Ruby-throated Hummingbird.\*\*

Summer resident, May 3–September 12. Four nests found.

*Megaceryle alcyon alcyon*, Eastern Belted Kingfisher.

Summer visitor, March 11–November. Casually in winter in open years.

*Colaptes auratus luteus*, Northern Flicker.\*\*

Summer resident, occasional in winter. Nest first found in 1905.

*Ceophloeus pileatus pileatus*, Southern Pileated Woodpecker.

Occasional. Seen on island and main shore several times.

*Centurus carolinus*, Red-bellied Woodpecker.\*\*

Resident. First seen October 7, 1906. Nest found April 8, 1917.

*Sphyrapicus varius varius*, Yellow-bellied Sapsucker.

Spring and autumn migrant. Occasionally seen in winter.

*Dryobates villosus villosus*, Eastern Hairy Woodpecker.\*\*

Resident. Rather common. Young seen June 26.

*Dryobates pubescens medianus*, Northern Downy Woodpecker.\*\*

Resident, breeding. At least four pairs live on island; young seen repeatedly.

*Tyrannus tyrannus*, Eastern Kingbird.

Casual in summer, April 25–August 20. Female feeding young back of Lock 11, July 23, 1933.

- Myiarchus crinitus boreus*, Northern Crested Flycatcher.\*  
Summer resident, April 23–September 12. Undoubtedly breeds.
- Sayornis phoebe*, Eastern Phoebe.\*\*  
Summer resident, March 1–October 23. Nesting on porch of cabin almost every year since 1904.
- Empidonax flaviventris*, Yellow-bellied Flycatcher.  
Collected in May.
- Empidonax virescens*, Acadian Flycatcher.\*\*  
Summer resident, May 13–September 12. Breeding.
- Empidonax minimus*, Least Flycatcher.  
Casual spring migrant.
- Myiochanes virens*, Eastern Wood Pewee.\*\*  
Summer resident, April 20–October 12.
- Otocoris alpestris praticola*, Prairie Horned Lark.  
Rare. Heard January 12 and November 23, 1919.
- Iridoprocne bicolor*, Tree Swallow.  
Casual migrant, April 4–August 11.
- Riparia riparia riparia*, Bank Swallow.  
Casual visitor, spring and late summer.
- Stelgidopteryx ruficollis serripennis*, Rough-winged Swallow.\*  
Summer resident, April 2–August 22, breeding at Lock 11.
- Hirundo erythrogaster*, Barn Swallow.  
Summer visitor, April 13–August 28.
- Petrochelidon albifrons albifrons*, Northern Cliff Swallow.  
Casual, May, June and August.
- Progne subis subis*, Purple Martin.  
Summer visitor, April 1–September 7.
- Cyanocitta cristata cristata*, Northern Blue Jay.\*\*  
Resident. Nest, May 1, 1910.
- Corvus brachyrhynchos brachyrhynchos*, Eastern Crow.  
Present in winter.
- Corvus brachyrhynchos paulus*, Southern Crow.\*  
Resident. Nested on main shore, 1916.
- Corvus ossifragus*, Fish Crow.  
Casual visitor.
- Penthestes carolinensis carolinensis*, Carolina Chickadee.\*\*  
Common resident.
- Baeolophus bicolor*, Tufted Titmouse.\*\*  
Common resident.
- Sitta carolinensis carolinensis*, White-breasted Nuthatch.\*\*  
Not uncommon resident.
- Sitta canadensis*, Red-breasted Nuthatch.  
Irregular migrant, usually in April and September.
- Certhia familiaris americana*, Brown Creeper.  
Not uncommon migrant, October 7–April 23.
- Troglodytes aëdon aëdon*, Eastern House Wren.\*  
Summer visitor, April 23–October 16.
- Nannus hiemalis hiemalis*, Eastern Winter Wren.  
Winter visitor, October 7–April 25.



*Thryothorus ludovicianus ludovicianus*, Carolina Wren.\*\*

Resident, breeding.

*Mimus polyglottos polyglottos*, Eastern Mockingbird.\*

Once nested in shrubbery back of Lock 11.

*Dumetella carolinensis*, Catbird.\*\*

Summer resident, April 25–October 16.

*Toxostoma rufum*, Brown Thrasher.\*

A casual summer visitor.

*Turdus migratorius migratorius*, Eastern Robin.

Common during migrations and at times in winter.

*Turdus migratorius achrusterus*, Southern Robin.\*

Breeds. Present April to October.

*Hylocichla mustelina*, Wood Thrush.\*\*

Summer resident, April 20–September 30.

*Hylocichla guttata faxoni*, Eastern Hermit Thrush.

Regular migrant, casual in winter, October 16–April 6.

*Hylocichla ustulata swainsoni*, Olive-backed Thrush.

Migrant, April 29–May 31, September 5–October 5.

*Hylocichla minima aliciae*, Gray-cheeked Thrush.

Migrant, May 9–May 27, October 2.

*Hylocichla fuscescens fuscescens*, Veery.

Migrant, April 9–June 2, September 5.

*Sialia sialis sialis*, Eastern Bluebird.\*\*

Resident.

*Polioptila caerulea caerulea*, Blue-gray Gnatcatcher.\*\*

Summer resident, March 30–September. Several nests found.

*Regulus satrapa satrapa*, Eastern Golden-crowned Kinglet.

Winter visitor, October 6–April 21.

*Corthylio calendula calendula*, Eastern Ruby-crowned Kinglet.

Migrant, March 25–May 5, October 1–October 22.

*Anthus spinoletta rubescens*, American Pipit

Number seen on muddy shore, March 25, 1906.

*Bombycilla cedrorum*, Cedar Waxwing.\*\*

Rare resident. Common some seasons in autumn.

*Lanius ludovicianus migrans*, Migrant Shrike.

Specimen secured at west end of property.

*Sturnus vulgaris vulgaris*, Starling.\*\*

Regular in occurrence. First observed August 31, 1919. May 7, 1931 one entered nesting hole in sycamore.

*Vireo griseus griseus*, White-eyed Vireo.\*\*

Summer resident, April 26–October 2.

*Vireo flavifrons*, Yellow-throated Vireo.\*\*

Summer resident, April 23–September 19.

*Vireo solitarius solitarius*, Blue-headed Vireo.

Migrant, April 9–May 5, October 20–November 5.

*Vireo olivaceus*, Red-eyed Vireo.\*\*

Summer resident, April 27–October 14. One of the most abundant breeding birds.

*Vireo philadelphicus*, Philadelphia Vireo.

Autumn migrant, September 5–October 5.

*Vireo gilvus gilvus*, Eastern Warbling Vireo.

One, April 25, 1926.

*Mniotilta varia*, Black and White Warbler.\*\*

Summer resident, April 11–October 6.

*Helmitheros vermivorus*, Worm-eating Warbler.\*

Rare summer resident, April 26–August 14.

*Vermivora chrysoptera*, Golden-winged Warbler.

Migrant. Several collected May 5 to 7; recorded August 28, 1921.

*Vermivora pinus*, Blue-winged Warbler.

Rare spring migrant; seen August 28–September 5 in fall.

[*Vermivora lawrencei*, Lawrence's Warbler.

One secured May 12, 1907.]

*Vermivora peregrina*, Tennessee Warbler.

One secured September 5, 1921; one seen May 20, 1928.

*Vermivora ruficapilla ruficapilla*, Nashville Warbler.

One seen May 24, 1917.

*Compsothlypis americana pusilla*, Northern Parula Warbler.

Regular in migration.

*Compsothlypis americana americana*, Southern Parula Warbler.\*\*

Summer resident. April 18–October 7.

*Dendroica aestiva aestiva*, Eastern Yellow Warbler.

Seen occasionally in May.

*Dendroica magnolia*, Magnolia Warbler.

Migrant, May 7–May 30, August 29–October 9.

*Dendroica tigrina*, Cape May Warbler.

Collected in May; seen October 6, 1911.

*Dendroica caerulescens caerulescens*, Black-throated Blue Warbler.

Migrant, April 30–May 30, September 5–October 14.

*Dendroica coronata*, Myrtle Warbler.

Common migrant, rare in winter, September 28–May 9.

*Dendroica virens virens*, Black-throated Green Warbler.

Migrant, April 18–May 26, September 9–October 7.

*Dendroica caerulea*, Cerulean Warbler.\*

One collected May 29, 1902. One seen May 5, 1935.

*Dendroica fusca*, Blackburnian Warbler.

Migrant, April 23–June 2, August 22–September 12.

*Dendroica pensylvanica*, Chestnut-sided Warbler.

Migrant, May 1–30, August 14–October 14.

*Dendroica castanea*, Bay-breasted Warbler.

Migrant, April 27–May 30, August 27–October 3.

*Dendroica striata*, Black-poll Warbler.

Migrant, May 17–June 9, September 7–October 14.

*Dendroica pinus pinus*, Northern Pine Warbler.

Occasional in April.

*Dendroica discolor discolor*, Northern Prairie Warbler.\*

Uncommon summer resident.

*Dendroica palmarum hypochrysea*, Yellow Palm Warbler.

Migrant in spring, March 28–May 13.

*Seiurus aurocapillus*, Oven-bird.\*\*

Summer resident, April 23–October 2.

*Seiurus noveboracensis noveboracensis*, Northern Water-thrush.

Migrant, April 18–June 2, August 7–September 15.

*Seiurus motacilla*, Louisiana Water-thrush.

Summer visitor, April 10–July 10.

*Oporonis formosus*, Kentucky Warbler.\*\*

Common summer resident, April 30–September 16.

*Oporonis agilis*, Connecticut Warbler.

Seen October 11, 1908; adult male collected May 17, 1909.

*Oporonis philadelphia*, Mourning Warbler.

Four specimens taken in May.

*Geothlypis trichas trichas*, Maryland Yellow-throat.\*\*

Summer resident, April 24–September 24.

*Geothlypis trichas brachidactyla*, Northern Yellow-throat.

Found in migration.

*Icteria virens virens*, Yellow-breasted Chat.\*\*

Summer resident, April 26–September 1.

*Wilsonia citrina*, Hooded Warbler.\*

Summer visitor, April 30–September 11.

*Wilsonia pusilla pusilla*, Wilson's Warbler.

Migrant, May and September.

*Wilsonia canadensis*, Canada Warbler.

Migrant, May 6–June 2, August 21–September 12.

*Setophaga ruticilla*, American Redstart.\*\*

Summer resident, April 22–October 2.

*Passer domesticus domesticus*, English Sparrow.

Of regular occurrence near Lock 11. One seen April 20, 1919, at cabin.

*Dolichonyx oryzivorus*, Bobolink.

Recorded flying over August 28–September 25.

*Sturnella magna magna*, Eastern Meadowlark.

One seen in big field April 8, 1920. Flying over, two other occasions.

*Agelaius phoeniceus phoeniceus*, Eastern Red-wing.

Small flocks seen March to May, August to September.

*Icterus spurius*, Orchard Oriole.\*

Seen on three occasions back of Lock 11.

*Icterus galbula*, Baltimore Oriole.

Not uncommon visitor in May, one June 6, 1926. Family seen on main shore August 7, 1921.

*Euphagus carolinus*, Rusty Blackbird.

Stragglers found in March and October. Once December 8.

*Quiscalus quiscula quiscula*, Purple Grackle.

Casual, sometimes in flocks, February 14–October 9.

*Molothrus ater ater*, Eastern Cowbird.\*\*

Seen May 26, 1907, and May 30, 1927; one taken May 2, 1920. Egg found in ovenbird's nest.

*Piranga erythromelas*, Scarlet Tanager.\*\*

Summer resident, April 23–October 13.

*Piranga rubra rubra*, Summer Tanager.

One September 2, 1934.

*Richmondia cardinalis cardinalis*, Eastern Cardinal.\*\*

Resident.

*Hedymeles ludovicianus*, Rose-breasted Grosbeak.

Migrant, April 30–May 18, September 7–October 3.

*Passerina cyanea*, Indigo Bunting.\*\*

Summer resident, April 27–October 3.

*Carpodacus purpureus purpureus*, Eastern Purple Finch.

Common, October 16–May 26. Abundant in spring migration.

*Spinus pinus pinus*, Northern Pine Siskin.

Reported December 8, 1918, November 14 and 23, 1919, April 25, 1920, and November 6, 1927.

*Spinus tristis tristis*, Eastern Goldfinch.\*\*

Resident.

*Loxia curvirostra pusilla*, Red Crossbill.

Seen February 14, 1909, November 14, 1926, and May 30, 1917.

*Pipilo erythrophthalmus erythrophthalmus*, Red-eyed Towhee.\*

Summer visitor, April 13–November 4.

*Passerculus sandwichensis savanna*, Eastern Savannah Sparrow.

Seen in big field, April 4, 1926.

*Ammodramus savannarum australis*, Eastern Grasshopper Sparrow.

A pair seen in big field, May 2, 1920.

*Poocetes gramineus gramineus*, Eastern Vesper Sparrow.

Several seen in big field, April 8, 1920.

*Junco hyemalis hyemalis*, Slate-colored Junco.

Winter resident, September 30–May 17.

*Spizella arborea arborea*, Eastern Tree Sparrow.

Winter resident, November 23–April 8.

*Spizella passerina passerina*, Eastern Chipping Sparrow.\*\*

Summer resident, April 23–November 8.

*Spizella pusilla pusilla*, Eastern Field Sparrow.\*\*

Summer resident, March 19–September 24.

*Zonotrichia leucophrys leucophrys*, White-crowned sparrow.

One, October 20, 1929.

*Zonotrichia albicollis*, White-throated Sparrow.

Winter resident, September 27–May 20.

*Passerella iliaca iliaca*, Eastern Fox Sparrow.

Migrant, February 23–April 11, October 9–December 3.

*Melospiza lincolni lincolni*, Lincoln's Sparrow.

One collected, May 9, 1932.

*Melospiza georgiana*, Swamp Sparrow.

Migrant, March 11–May 27, October 9–20.

*Melospiza melodia melodia*, Eastern Song Sparrow.\*\*

Resident, abundant in migration.









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FIVE NEW PLANTS OF THE GENUS *APLOPAPPUS*.

BY S. F. BLAKE.

The new forms of *Aplopappus* here described have been found in the course of recent work on material of that genus in the United States National Herbarium and on specimens borrowed from the Dudley Herbarium of Stanford University.

*Aplopappus wigginsii* Blake, sp. nov.

Annuus parvus basi ramosus decumbens, ramis strigosis foliosis; folia parva inferiora pinnatisecta (lobis 3-5) petiolata cetera linearia integra apice albo-setosa strigosa vel laxius hirsuto-pilosa; capitula mediocria apice ramorum et ramulorum paucorum solitaria vix pedunculata radiata flava; involucri depresso-hemisphaerici 4-5-seriati gradati 4-5 mm. alti appressi phyllaria exteriora anguste linearia strigosa et parum glandulosa apice setosa medio herbacea margine anguste subscariosa, interiora subduplo latiora acuminata stipitato-glandulosa supra medium subherbacea; radii 12-15; achenia pilosa, ea disci anguste obovoidea compressa substipitata; pappus corolla disci quarta parte brevior; appendices ramorum styli anguste triangulari-subulatae lineis stigmatiferis subtriplo longiores.

Slender depressed annual, somewhat yellowish-green, without obvious main stem, several-branched within about 1 cm. of the base, the branches 3-9 cm. long, simple or few-branched, green or purplish; leaves alternate, the internodes 2-4 mm. long; lower leaves 8-13 mm. long, strigose or more loosely hirsute-pilose chiefly on the lower surface, the blades shorter than petiole, pinnately 3-5-parted, the lobes 2-4 mm. long, 0.5-1 mm. wide, each tipped with a white bristle 0.5-0.8 mm. long; other leaves linear, entire, sessile, 3-8 mm. long, 0.5-0.8 mm. wide, similarly pubescent, not setose-ciliate, tipped with a white seta 0.5 mm. long or less; heads solitary at tips of branches and branchlets, not obviously peduncled, 1.5-1.8 cm. wide (as pressed); disk (as pressed) 5-6 mm. high, 7-9 mm. thick; outer phyllaries linear, acute, 2.5-3 mm. long, 0.4-0.6 mm. wide, tipped with a bristle 0.3 mm. long or less, subherbaceous along midline with narrow subscarios margin or sometimes subherbaceous essentially throughout except for the subchartaceous whitish base, sometimes with small apical purplish spot, 1-vittate, the inner broader (0.8-1 mm. wide), often with

less developed bristle, whitish and subchartaceous about to middle, then subherbaceous and narrowly subscarious-margined, 1-vittate, sometimes purplish toward tip, evenly but not densely stipitate-glandular; receptacle flattish, alveolate; rays 12-15, yellow, pistillate, sparsely puberulous on tube and base of lamina on back, the tube 1.5 mm. long, the lamina oval, 6 mm. long, 2.5 mm. wide, 3-denticulate, 4-nerved; disk flowers about 50, their corollas yellow, sparsely puberulous on teeth and sometimes toward base of throat, otherwise glabrous, 3 mm. long (tube 0.7 mm., throat funnelform, 1.8 mm., teeth triangular-ovate, 0.5 mm. long); ray achenes obovoid, plump, 1.6 mm. long, about 10-nerved, densely erect-pilose, their pappus similar to that of the disk but shorter (1.8 mm. long); disk achenes slenderly obovoid, 2-2.3 mm. long, 0.4-0.5 mm. wide, with sub-stipitiform base, moderately densely erectish-pilose, distinctly compressed, 2-nerved, the sides rounded, nerveless, the pappus rather sparse, 2.5 mm. long, about  $\frac{3}{4}$  the length of corolla, of yellowish-white graduated hispidulous bristles; style branches 1-1.2 mm. long, the stigmatic region oblong, 0.25-0.35 mm. long, the erect appendages nearly 3 times as long, narrowly triangular-subulate, 0.75-0.85 mm. long, rather sparsely and coarsely hispidulous.

BAJA CALIFORNIA: Gravelly slopes and margins of meadow at La Encantada, Sierra San Pedro Mártir, alt. about 2200 m. (7200 ft.), 18 Sept. 1930, *I. L. Wiggins & D. Demaree* 4914 (type no. 1,589,676, U. S. Nat. Herb.).

This little plant is a member of the group of annual species of the section *Blepharodon*, as the genus is arranged by Hall in his monograph, and is closely similar in general appearance to the depressed form of *A. gracilis* (Nutt.) A. Gray. In that species the leaves vary from pinnatisect or bipinnatisect (the lower) with more numerous lobes to deeply or shallowly toothed with several pairs of teeth tipped with relatively long white bristles, while the upper are sometimes subentire but with several pairs of marginal setae; the involucre is 5-6-seriate, more closely and regularly graduated, white-strigose or hirsute-pilose; the phyllaries are uniform and narrow, with conspicuous green or purple-green terminal spot and much better developed seta; and the pappus is nearly or quite as long as the disk corolla. From *A. gracilis*, as well as from all other species of its section except the otherwise very distinct *A. gymnocephalus* and *A. nuttallii*, *A. wigginsii* also differs in its very long style appendages, nearly or quite three times as long as the stigmatic region.

***Aplopappus scopulorum* var. *hirtellus* Blake, var. nov.**

Rami hornotini, pedunculi, et folia minute hirtella.

UTAH: Cedar Canyon, Iron Co., 2 Sept. 1931, *A. O. Garrett* 6051 (type no. 1,623,835, U. S. Nat. Herb.); Armstrong and White Canyons, near the Natural Bridges, San Juan Co., alt. 1600-1800 m., 4-6 Aug. 1911, *P. A. Rydberg & A. O. Garrett* 9543.

In the typical form of *Aplopappus scopulorum* (Jones) Blake the stem and leaves are perfectly smooth and glabrous, except for the spinulose-

ciliolate margin of the leaves; the peduncles are occasionally sparsely hispidulous.

***Aplopappus salicinus* Blake, sp. nov.**

Frutescens glaberrimus parum resinosus; rami tenuissimi pallide virides impresso-punctati; folia angustissime lineari-lanceolata falcata ca. 5 cm. longa 2 mm. lata plana 3-nervia non ciliolata impresso-punctata; capitula (immatura) pauca discoidea ca 11-12-flora minuscula pedicellata subcymosa; involucri ca. 4.5 mm. alti turbinati valde gradati ca. 6-seriati phyllaria e ovatis oblonga obtusa chartacea margine anguste scariosa; achenia (valde immatura) hirsuta.

Shrubby, the height unknown; branches simple or subsimple, subterete, about 1 mm. thick; internodes 1-2 cm. long; leaves 3.5-6 cm. long, 1.5-3 mm. wide, erect to deflexed, without axillary fascicles, attenuate, sessile and somewhat narrowed at base, entire, 3-nerved, firm, entirely glabrous, densely impressed-punctate on both sides; heads 3-7 (rarely subsolitary) at tips of stems and of the few peduncles from the upper axils, subcymose or sometimes subracemose, the peduncles very slender, naked or nearly so, 0.8-3.5 cm. long, the pedicels mostly 2-5 mm. long, naked or with a few small blunt bracts above; disk (immature) 5 mm. high, 3 mm. thick; involucre about 4.5 mm. high, strongly graduate, about 6-seriate, appressed, the phyllaries about 27, oblong-ovate to oblong, 0.8-1.2 mm. wide, very obtuse, with narrow subscarious margin, erose toward tip, glabrous, chartaceous and whitish, the outer (about 3 series) with somewhat thickened barely greenish tip bearing a rather obscure elliptical gland, the inner not thickened at tip, all with obscure costa; corollas (immature) apparently whitish, glabrous, 2.8 mm. long (tube 0.5 mm., throat 1 mm., teeth triangular-lanceolate, 1.3 mm. long); achenes (very immature) obovoid, erect-hirsute, 1 mm. long; pappus (immature) whitish, 2.8 mm. long, of graduated hispidulous bristles, the inner thickened toward apex; style branches with oblong acutish hispidulous appendages 0.8 mm. long, barely surpassing the stigmatic lines (these 0.7 mm. long).

ARIZONA: Bright Angel Trail, Grand Canyon, 22 Oct. 1905, *Alice Eastwood* 10 (type no. 619950, U. S. Nat. Herb.).

The type of this species is so similar in appearance to *Aplopappus scopulorum* (Jones) Blake that it is not surprising that it was listed under that species by the late Dr. H. M. Hall in his monograph of the genus. In that species, however, the leaves are hispidulous-ciliolate, and the impressed glands of the new species are lacking. The heads of Miss Eastwood's plant are unfortunately so immature that no critical comparison with those of *A. scopulorum* can be made. The deep lobes of the corolla are the same in both, and the styles are not clearly distinguishable. In a single head of *A. scopulorum* dissected (from Jones 6074) the phyllaries were decidedly more numerous (about 42).

***Aplopappus ferrisiae* Blake, sp. nov.**

Frutex parvus erecte ramosus foliosus resinosus glaber; folia anguste oblanceolata acuta v. obtusa sessilia integra plana 8-15 mm. longa 1.2-2.8

mm. lata crassa utrinque subbullata et impresso-punctata pallide viridia; capitula parva discoidea 5-6-flora subcylindrica ca. 7 mm. alta in axillis superioribus 1-3-nata subsessilia, inflorescentiam angustam foliaceam efficientia; involucri 6-7 mm. alti valde gradati ca. 6-seriati phyllaria ca. 18 chartacea margine anguste subscariosa albescentia acuta v. acuminata breviter mucronata, extima oblongo-lanceolata media anguste oblonga intima linearia; corollae ut videtur pallide flavae anguste infundibuliformi-cylindricae, dentibus ovatis brevibus; achenia submatura obovoidea 5-nervia subdense erecto-hirsuta; styli ramorum appendices anguste triangulares acuminatae lineis stigmatiferis paullo longiores.

Several-stemmed shrub, 1-2 dm. high and perhaps more, erect or erectish, glabrous and more or less resinous throughout, the branches brownish-white; leaves alternate, erectish, without or with only small and inconspicuous axillary fascicles, the internodes mostly 1-5 mm. long; blades often mucronulate, 1-nerved, the veinlets on both sides reticulate and impressed and freely dotted with inconspicuous impressed glands; heads in 1's and 3's in the upper axils, sessile or on peduncles 3 mm. long or less, forming a virgate inflorescence 1-2 cm. long, bracted by small leaves mostly shorter than the heads; outermost phyllaries about 2 mm. long, 0.8 mm. wide, the inmost about 7 mm. long, 0.6-0.8 mm. wide, the mucro 0.1-0.3 mm. long, subulate, sometimes inflexed, all the phyllaries serrulate toward apex, and there with a narrow lance-linear brownish area surrounding the single narrowly linear not conspicuous glandular vitta, this about 1/3 the length of the phyllary and often somewhat carinate; corollas (not completely mature) 4.8-5.2 mm. long, glabrous (tube about 1 mm. long, throat slightly dilated upwardly from near the middle, about 3.5 mm. long, teeth triangular-ovate, 0.6-0.8 mm. long); achenes plumply obovoid, 1.2-1.4 mm. long, 0.7 mm. thick; pappus brownish-white, graduated, 4 mm. long, the bristles hispidulous, the outermost only 1.2 mm. long; stigmatic lines 0.7 mm. long, the appendages 0.9-1 mm. long.

BAJA CALIFORNIA: In playa south of San Vicente, 13 August 1930, *W. S. Cooper* 75 (type in Dudley Herb., no. 215690; photog. and fragments, U. S. Nat. Herb.); one of predominant shrubs just beyond Johnston's Ranch on road to Hamilton Ranch, Santo Domingo, in coastal plain, 1 Mar. 1934, *Roxana S. Ferris* 8516.

As the genus is arranged in Hall's recent monograph, this species enters the section *Ericameria* and ranges with *Aplopappus propinquus* Blake and *A. sonoriensis* (A. Gray) Blake in Hall's key. It differs widely from these species in inflorescence, foliage, and characters of head and involucre. In its virgate although very much shorter inflorescence it resembles *A. orcuttii* A. Gray, and its leaves are very similar in every way to the reduced upper ones of that species. The involucre in *A. orcuttii*, however, is composed of much more numerous, more closely graduated, blunt or bluntish phyllaries. From all of the *A. venetus* group, which it much resembles in the character of the foliage, it differs fundamentally in the character of the phyllaries and in the comparatively long style-appendages. The phyllaries in *A. ferrisiae* are extremely deciduous, but this may be due to the somewhat immature state in which the type was collected.



The collection made by Mrs. Ferris is old and weathered, but shows a somewhat similar condition.

***Aplopappus martirensis* (Wiggins) Blake.**

*Ericameria martirensis* Wiggins, Contr. Dudley Herb. 1: 177. pl. 17, f. 2. 1933.

As stated by Prof. Wiggins, the nearest relationship of this species of northern Baja California is with *A. sonoriensis* (A. Gray) Blake (*Ericameria diffusa* Benth.) and *A. propinquus* Blake (*E. brachylepis* (A. Gray) Hall), although its inflorescence is more regularly cymose than in either of those species. It is known only from the type collection, Wiggins & Demaree 4893, from La Encantada, Sierra San Pedro Mártir, altitude 2200 meters, which has been sent me for examination through the kindness of Mrs. R. S. Ferris.

***Aplopappus lehmannii* var. *subcalvus* Blake, var. nov.**

Folia maturitate subtus viridia subdense sessili-glandulosa et non dense villosa pilis laxis plusminusve intricatis.

COLOMBIA: "Shrub 8-10 ft., corolla orange-yellow," in woods, western slope of Páramo Rico, Eastern Cordillera, Dept. Santander, alt. 3300-3600 m., 15-19 Jan. 1927, *E. P. Killip & A. C. Smith* 17816 (type no. 1,353,341, U. S. Nat. Herb.).

This plant is described with some hesitation as a variety of *Aplopappus lehmannii* (Hieron.) Blake. It differs rather conspicuously from the specimens of that species examined in the green, rather densely glandular and only sparsely pilose lower surface of the leaves, those of *A. lehmannii* being densely grayish or ochroleucous-tomentose beneath. The leaves are also more long-tapering at base in var. *subcalvus*, tending in fact to narrowly obovate, but this difference may be only individual. The type of this variety has been mentioned by Hall<sup>1</sup> as possibly only a form of *A. caucanus*, but his description of the leaves as "only puberulous" beneath is incorrect. Its persistently tomentulose stem and more or less tomentulose outermost phyllaries, however, ally it rather with *A. lehmannii*. The young leaves are rather densely and loosely ochroleucous-tomentose beneath, this feature also indicating a connection with *A. lehmannii* rather than *A. caucanus*.

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<sup>1</sup>The genus *Haplopappus*, 359. 1928.









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NEW AMERICAN MUSTELIDS OF THE GENERA  
MARTES, GULO, AND LUTRA.

BY E. A. GOLDMAN.

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The mustelid genera *Martes* (subgenus *Pekania*), *Gulo*, and *Lutra* have been somewhat neglected by taxonomists and students of geographic distribution owing, no doubt, to the fact that few complete specimens have been available for study. The reason for the shortage of material is readily understood. The skins of all of these animals have a very high commercial value as furs and too intensive trapping for the market resulted in their extermination, or reduction to small numbers, before museum collectors entered the field. As in many other widely ranging groups, however, the skulls rather than the skins present the most reliable index to specific and subspecific differentiation. Fortunately a considerable number of these essential parts, available at little or no cost, have been obtained from trappers, in some cases in series affording unusual opportunities for determining the range of individual variation and the stability of characters.

The otters, of many kinds, are marvelously adapted to a life spent largely in salt or fresh waters, according to species, and this adaptation, including the procurement of food in an element harboring few competitors and few natural enemies, places them among the most successful of mammalian families, as attested by their nearly world-wide distribution. But they are unable to cope with the intensive use of death-dealing devices and the unfavorable modification of habitat introduced by civilized man.

The river otters are represented in Canada and the United States, including Alaska, by the *Lutra canadensis* group, which proves to be highly plastic, as shown by the number and dispersal of recognizable forms. The southern limit of the group is nominally near the Mexican border, but otters, formerly numerous, have been extinguished over vast areas to the northward. Farther south in Mexico, Central and South America, it is

replaced by a tropical group, *Lutra annectens* and allied forms. The *L. canadensis* group differs notably from its Mexican and Central American congeners in external characters. The rhinarium is large and naked to a broad, wedge-shaped line connecting points well behind the posterior plane of the nostrils, instead of small and hairy along the upper side to within this plane as in *annectens*. The webs between the toes of the fore and hind feet are hairy, instead of naked, on the under side. The skulls are very similar in general form and the teeth in sculpture, but the rostrum and palate are longer and the premolars less closely crowded in *canadensis* than in *annectens*.

*Lutra destructor* Barnston (Canad. Nat. and Geolog., vol. 8, p. 152, figs. 1-6, 1863) was based on two specimens from Michipicoten, Lake Superior, Ontario, which had been sent by the author to the Smithsonian Institution, where they were entered in the mammal catalogue October 17, 1861. These specimens were overlooked in the collection until recently detected by Dr. Remington Kellogg, to whom I am indebted for bringing them to my attention. Barnston did not fix a type or definite locality, merely assigning the animal to the "region of North-eastern America." One of the specimens, number 4445/5128, a rather young female, now consisting of the skeleton including skull is designated as lectotype. The skin that originally accompanied the skeleton can not be found. *Lutra destructor* Barnston must be placed in the synonymy of *Lutra canadensis canadensis* Schreber, which ranges from the Atlantic coast west to Lake Superior.

The present paper is based mainly upon a study of skulls of the mustelid genera mentioned in the collections of the U. S. National Museum. Lists of specimens examined, therefore, refer to skulls only unless otherwise indicated.

For the loan of pertinent material for comparison my thanks are due to Dr. H. E. Anthony and Mr. G. H. H. Tate, American Museum of Natural History.

### ***Martes pennanti columbiana*, subsp. nov.**

BRITISH COLUMBIA FISHER.

*Type*.—From Stuart Lake, near headwaters of Fraser River, British Columbia. No. 56953, ♂ adult, skull only, U. S. National Museum (Biological Survey collection); collected by W. E. Traill, 1893.

*Distribution*.—Rocky Mountain region from northern British Columbia south, formerly, at least, to central Idaho; east, mainly in southern Canada, grading toward *Martes pennanti pennanti* in Manitoba.

*Characters*.—Color about as in *M. p. pennanti* of eastern Canada and the northeastern United States, and *Martes pennanti pacifica* of central Washington. Skull somewhat larger, more elongated than either; palate decidedly longer, usually extending farther posteriorly beyond molars but relatively rather narrow at constriction; rostrum and maxillary tooth row usually longer; carnassials usually larger; premolars less closely crowded.

*Measurements*.—An adult male from Alturas Lake, Sawtooth Range, Idaho: Total length, 1,013 mm.; tail vertebrae, 395; hind foot, 128. *Skull*

(type): Greatest length, 131.1; condylobasal length, 120.8; breadth of rostrum (just behind roots of canines), 24.5; interorbital breadth, 26.7; zygomatic breadth, 79.4; breadth of braincase (across mastoid processes), 58.9; palatal length (gnathion to palation), 65.7; palatal constriction, 11; maxillary tooth row (alveoli), 45; crown length (outer side) of upper carnassial, 12.8; crown width of upper carnassial, 7.5. Average of five adult male topotypes: Greatest length, 131.4 (130.5–132.1); condylobasal length, 120.7 (118.3–121.7); breadth of rostrum, 24.9 (23.8–26); interorbital breadth, 27.4 (27–28.6); zygomatic breadth, 79.5 (77.8–82.5); breadth of braincase, 56.9 (55.1–59.9); palatal length, 64.8 (63.8–66); palatal constriction, 11 (10.4–11.8); maxillary tooth row, 43.5 (42.1–45.1); crown length of upper carnassial, 12.8 (12.4–13.7); crown width of upper carnassial, 7.4 (7.3–7.5). Average of five adult female topotypes: Greatest length 108 (106.6–108.9); condylobasal length, 103.3 (100.3–106.1); breadth of rostrum, 19.9 (18.6–20.4); interorbital breadth, 22.9 (21.8–23.6); zygomatic breadth, 58.6 (56.6–60.2); breadth of braincase, 47.3 (45.5–49); palatal length, 54.6 (53.4–56.8); palatal constriction, 10.3 (9.9–11); maxillary tooth row, 38 (36.7–39.4); crown length of upper carnassial, 10.9 (10.5–11.3); crown width of upper carnassial, 6.2 (5.6–6.4).

*Remarks.*—Rhoads (Trans. Amer. Philos. Soc., n. s., vol. 19, p. 434, 1898) the first reviser of the fishers of North America, quoting Pennant, fixed the type region of *M. pennanti* as "New York and Pennsylvania." *Martes pennanti* is much less readily subdivisible into geographic races than many other species with transcontinental ranges. No very reliable color differences are apparent, and differential cranial characters are slight. The skull of *M. p. pacifica* is similar in size to that of typical *pennanti*, but usually differs noticeably in the greater breadth of the rostrum and the more widely spreading zygomata. The skull of *M. p. columbiana* is larger and may usually be distinguished from those of the other forms by the greater length of the palate. Specimens from east of the Rocky Mountains appear to grade toward *pennanti*.

*Specimens examined.*—Total number, 95, as follows:

Alberta: Fort Smith 1; Peace River (35 miles north of Big Island), 2; Prairie Creek (250 miles west of Edmonton), 2.

British Columbia: Fort Grahame, Finlay River, 5; Lightning Lake, upper Skagit River, 3; Stuart Lake (type locality), 71; Tacla Lake, 6.

Manitoba: Cross Lake, 2; Oxford House, 2.

Idaho: Alturas Lake, Sawtooth Mountains, 1 (skin and skull).

### ***Gulo luscus vancouverensis*, subsp. nov.**

VANCOUVER ISLAND WOLVERINE.

*Type.*—From Great Central Lake, Vancouver Island, British Columbia. No. 211499, ♂ old adult, skull only, U. S. National Museum (Biological Survey collection), collected by W. R. Kent, March 27, 1913. X—catalogue number 14081.

*Distribution.*—Restricted to Vancouver Island.

*Characters.*—Very similar to typical *Gulo luscus* of Hudson Bay and to



the animal inhabiting the British Columbia mainland, but smaller. Skull compared with that of typical *luscus*: Very similar in general form, but smaller in general dimensions, although relatively rather broad across zygomata; palate distinctly narrower in front of interpterygoid fossa; interpterygoid fossa narrower; zygomata relatively broader and heavier; audital bullae noticeably smaller; palatopterygoids more developed as trenchant descending wings than usual in *luscus*; symphysis of mandible relatively shorter; dentition about the same, but relatively rather heavy, the premolars large and closely crowded.

*Measurements*.—No external measurements available. *Skull* (type): Greatest length, 161.8 mm.; condylobasal length, 146.4; zygomatic breadth, 104.9; breadth of braincase (across mastoid processes), 83.9; interorbital breadth, 40.2; breadth across postorbital processes, 48.6; postorbital constriction, 33.7; palatal constriction, 16.8; maxillary toothrow (alveoli), 50.3; crown length (outer side) of upper carnassial, 21.4; diameter upper canine (antero-posterior), 11.6. Skull of an old adult female from Elk River, Vancouver Island: Greatest length, 146; condylobasal length, 131.9; zygomatic breadth, 90.7; breadth of braincase, 75.1; interorbital breadth, 34.3; breadth across postorbital processes, 42.7; postorbital constriction, 29; palatal constriction, 16.5; maxillary toothrow, 45.6; crown length of upper carnassial, 18.4; diameter upper canine, 9.8.

*Remarks*.—Several nominal species of wolverine have been described from the mainland. While the small number of skins examined are fairly uniform in color pattern, wide range of individual variation is shown in about 80 skulls examined from numerous localities. In making general comparisons I have not succeeded in segregating the named forms, but it is possible that several slightly differentiated geographic races may be referable to a single species. *Gulo luscus vancouverensis* is closely allied to the mainland animal, but appears to differ in combination of cranial dimensions.

*Specimens examined*.—Two, both from Vancouver Island.

### ***Lutra canadensis preblei*, subsp. nov.**

MACKENZIE OTTER.

From near McTavish Bay, Great Bear Lake (on canoe route from Lake Hardisty), Mackenzie. No. 147413, ♂ adult, skull only, U. S. National Museum (Biological Survey collection); collected by E. A. Preble, August, 1903. Original number 4894.

*Distribution*.—Mackenzie River basin and east to Hudson Bay; south to Alberta, Saskatchewan and Manitoba.

*Characters*.—Very similar to *Lutra canadensis canadensis* of eastern Canada, but skull larger; nasals longer, extending farther posteriorly beyond ends of maxillae (as shown by sutures visible in young); audital bullae more flattened, less inflated and projecting below level of basioccipital; dentition heavier. Compared with that of *Lutra canadensis interior* of Nebraska, the skull is very similar in size and general form, but audital bullae decidedly flatter, less rounded, less inflated and therefore less projecting below level of basioccipital; dentition lighter.

*Measurements.*—*Skull of type*: Condylobasal length, 116.7 mm.; zygomatic breadth, 79.2; breadth of braincase (across mastoid processes), 69; height of braincase (over audital bullae), 39.9; interorbital breadth, 25.6; postorbital constriction, 19; palatal constriction, 14.3; maxillary tooth row (alveoli), 37.3; crown length (outer side) of upper carnassial, 11.3; crown width of upper carnassial, 9.6. An adult female from Slave River, 10 miles below mouth of Peace River, Alberta: Condylobasal length, 111.1; zygomatic breadth, 71.8; breadth of braincase, 67; height of braincase, 38.5; interorbital breadth, 26.5; postorbital constriction, 22; palatal constriction, 14; maxillary tooth row, 36.2; crown length of upper carnassial, 11.6; crown width of upper carnassial, 9.1.

*Remarks.*—Specimens from Oxford House and other localities in Manitoba grade toward typical *canadensis*, but in size are more properly referable to the present form. Farther south *L. c. preblei* undoubtedly intergrades with *L. c. interior*, to which form examples from Elk River, Minnesota, appear to be assignable.

*Specimens examined.*—Total number, 36, as follows:

Alberta: Henry House, 1; Slave River, 1; Whitemud, 1.

Mackenzie: Fort Liard, 1; McTavish Bay, Great Bear Lake (type locality), 1; Fort Resolution, 1; Fort Smith, 1.

Manitoba: Cross Lake, 1; Oxford House, 23; Norway House, 5.

***Lutra canadensis optiva*, subsp. nov.**

MONTAGUE ISLAND OTTER.

*Type.*—From Zaikof Bay, Montague Island, Alaska. No. 137320, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection); collected by Charles Sheldon, 1905. X-catalogue number 5462.

*Distribution.*—Montague and Hinchinbrook islands and adjacent Kenai Peninsula.

*Characters.*—General color rather dull, near vandyke brown (Ridgway, 1912). Similar to *L. c. preblei* of the Mackenzie River basin, but skull somewhat larger, more angular; zygomata heavier; basioccipital region flatter, less bulging between audital bullae; audital bullae usually still flatter, less projecting below level of basioccipital; dentition heavier. Skull similar in general to that of *L. c. pacifica* of the high Cascade Mountain region of Washington, but relatively broader, less elongated; braincase less highly arched; audital bullae decidedly flatter.

*Measurements.*—*Skull of type*: Condylobasal length, 116 mm.; zygomatic breadth, 79.7; breadth of braincase (across mastoid processes), 72.6; height of braincase (over audital bullae), 40; interorbital breadth, 27.8; postorbital constriction, 20.1; palatal constriction, 15; maxillary tooth row (alveoli), 38.2; crown length (outer side) of upper carnassial, 12.9; crown width of upper carnassial, 10.3. An adult female from Cape Elizabeth, Kenai Peninsula: Condylobasal length, 111.7; zygomatic breadth, 75.3; breadth of braincase, 67.8; height of braincase, 38; interorbital breadth, 25.9; postorbital constriction, 18.6; palatal constriction, 13.6; maxillary

tooth row, 37; crown length of upper carnassial, 12.3; crown width of upper carnassial, 8.8.

*Remarks.*—Several mammals are known only from Montague Island, but the otters of the adjacent mainland agree closely with the insular animal. *L. c. optiva* requires no close cranial comparison with typical *canadensis* of eastern Canada, which is decidedly smaller with conspicuously larger, more inflated audital bullae.

*Specimens examined.*—Total number, 16, all from Alaska, as follows:

Cape Elizabeth, Kenai Peninsula, 10; Hinchinbrook Island, 1; Kenai Peninsula (without exact locality), 3; Montague Island (type locality), 2.

***Lutra canadensis yukonensis*, subsp. nov.**

YUKON VALLEY OTTER.

*Type.*—From Unalakleet, Norton Sound, Alaska. No. 21480, ♀ adult, skull only, U. S. National Museum; collected by E. W. Nelson, fall of 1879. Original number 112.

*Distribution.*—Bering Sea coast, Alaska Peninsula, Kuskokwim and Yukon river drainage, east to central Yukon, Canada.

*Characters.*—Similar to *L. c. preblei* of the Mackenzie River basin, but skull distinctly smaller; audital bullae more rounded and inflated. Compared with *L. c. optiva* of Montague Island the skull is smaller; mastoid processes less deflected downward, less hook-like; audital bullae more inflated; dentition lighter.

*Measurements.*—*Skull of type:* Condylbasal length, 105.3 mm.; zygomatic breadth, 73.8; breadth of braincase (across mastoid processes), 65.3; height of braincase over audital bullae, 39.5; interorbital breadth, 24.9; postorbital constriction, 21.1; palatal constriction, 15; maxillary tooth row, 34.9; crown length (outer side) of upper carnassial, 13; crown width of upper carnassial, 8.8.

*Remarks.*—A few specimens from widely dispersed localities appear to be referable to the form here described. Specimens from the Alaska Peninsula grade toward *L. c. optiva* in cranial characters. In color, however, the two forms appear to be nearly identical.

*Specimens examined.*—Total number, 16, as follows:

Alaska: Between Portage Bay and Becharof Lake, 5; Becharof Lake, 1 (skin and skull); Frosty Peak, Alaska Peninsula, 1; Kuskokwim River (East Fork, 1; base of Mount Sischoo, 1), 2; Mission, 1; Nushagak River, 1 (skin only); Ruby, 1; Tanana River, 1; Unalakleet, 1.

Yukon: Pelly River (mouth MacMillan River), 1.

***Lutra canadensis kodiacensis*, subsp. nov.**

KODIAK ISLAND OTTER.

*Type.*—From Uyak Bay, Kodiak Island, Alaska. No. 98142, adult, skull only (probably ♀), U. S. National Museum (Biological Survey collection); collected by C. Hart Merriam (found and presented to Merriam by George Bird Grinnell), July, 1899.

*Distribution.*—Kodiak and Afognak islands, Alaska.

*Characters*.—Similar to *L. c. yukonensis* and *L. c. optiva*, but skull somewhat higher and narrower than either; braincase less inflated laterally, more highly and narrowly arched; incisive foramina larger, more widely open; basioccipital region more inflated, bulging downward between audital bullae; audital bullae rather flat, much as in *optiva*; dentition medium.

*Measurements*.—*Skull of an adult, probably male, from Kodiak Island*: Condylobasal length, 116 mm.; zygomatic breadth, 74.4; breadth of braincase (across mastoid processes), 66.5; height of braincase (over audital bullae), 40.5; interorbital breadth, 24.2; postorbital constriction, 21; palatal constriction, 15.3; maxillary tooth row (alveoli), 37; crown length (outer side) of upper carnassial, 12.4; crown width of upper carnassial, 9.1. *Type* (probably female): Condylobasal length, 111.5; zygomatic breadth, 72.2; breadth of braincase, 65.9; height of braincase, 40.6; interorbital breadth, 24.3; postorbital constriction, 21.3; palatal constriction, 14.5; maxillary tooth row, 36.7; crown length of upper carnassial, 11.6; crown width of upper carnassial, 9.

*Remarks*.—This insular race is based on skulls only picked up by various collectors at different times from F. Bischoff in 1860 and C. Hart Merriam in 1899, to more or less fragmentary material dug out of the kitchen middens of former human inhabitants by A. Hrdlicka in 1934. All of the skulls agree in a combination of cranial details that sets them somewhat apart from the other subspecies. A skull from the neighboring island, Afognak, is larger with heavier dentition than any of those available from Kodiak Island, but is provisionally referred to the same form.

*Specimens examined*.—Total number, 15, all from Alaska, as follows: Afognak Island, 1; Kodiak Island, 14 (including Uyak Bay, 2; Lake Karluk, 1).

### *Lutra canadensis extera*, subsp. nov.

#### NAGAI ISLAND OTTER.

*Type*.—From Nagai Island, Shumagin Islands, Alaska. No. 12485, adult, skull and other parts of skeleton (probably ♂), U. S. National Museum; collected by W. H. Dall, 1872.

*Distribution*.—Known only from Nagai Island.

*Characters*.—Cranium low with strongly developed sagittal crest. In general resembling that of *L. c. yukonensis*, but braincase with sides more gradually tapering to a narrower postorbital constriction; palatal shelf narrower behind molars; mastoid processes more strongly deflected downward and inward; audital bullae flatter, more deeply excavated along inner sides; dentition similar, but rather light. Compared with *L. c. kodiacensis* the braincase is slightly lower and flatter, with sides tapering more evenly to a narrower postorbital constriction; palatal shelf narrower behind molars; audital bullae similarly flat, but more deeply excavated along inner sides; dentition lighter.

*Measurements*.—*Skull of type*: Condylobasal length, 112.3 mm.; zygomatic breadth, 74.7; breadth of braincase (across mastoid processes), 67.6;



height of braincase (over audital bullae), 40.3; interorbital breadth, 24.3; postorbital constriction, 19.4; palatal constriction, 13.7; maxillary tooth row (alveoli), 35; crown length (outer side) of upper carnassial, 11.5; crown width of upper carnassial, 8.5.

*Remarks.*—*L. c. extera* is based on a single skull, with parts of skeleton. Close alliance to *yukonensis* is indicated, but the characters pointed out appear to be beyond the probable range of individual variation and therefore distinctive.

***Lutra canadensis evexa*, subsp. nov.**

STUART LAKE OTTER.

*Type.*—From Stuart Lake, near headwaters of Fraser River, British Columbia. No. 47018, ♂ adult, skull only, U. S. National Museum (Biological Survey collection), collected by W. E. Traill, 1892.

*Distribution.*—Western slope of Rocky Mountains in central British Columbia.

*Characters.*—A medium-sized subspecies, with vault of cranium high and evenly rounded. Skull similar in size to that of *L. c. preblei* but braincase more highly and usually more narrowly arched; basioccipital region more bulging downward between audital bullae; mastoid processes more strongly deflected downward, more hook-like; dentition about the same. Skull closely resembling that of *L. c. pacifica* of western Washington, but decidedly smaller; braincase relatively and usually actually more highly arched; dentition lighter. Compared with that of *L. c. optiva* the skull is distinctly smaller; braincase higher; basioccipital region more bulging downward between audital bullae; bullae much more inflated; dentition lighter.

*Measurements.*—*Skull of type*: Condylobasal length, 113.4 mm.; zygomatic breadth, 78; breadth of braincase (across mastoid processes), 69.5; height of braincase (over audital bullae), 44.5; interorbital breadth, 25.4; postorbital constriction, 22.9; palatal constriction, 14.6; maxillary tooth row, 37.5; crown length (outer side) of upper carnassial, 11.4; crown width of upper carnassial, 8.9. An adult female topotype: Condylobasal length, 107.8; zygomatic breadth, 74.9; breadth of braincase, 63.9; height of braincase, 40.4; interorbital breadth, 22.8; postorbital constriction, 21.1; palatal constriction, 13.9; maxillary tooth row, 35.2; crown length of upper carnassial, 11.3; crown width of upper carnassial, 8.8.

*Remarks.*—*L. c. evexa* requires no close comparison with its insular geographic neighbor, *L. periclyzomæ*, which exceeds it in size and differs in important cranial details. It is based on a series of 36 skulls, mainly of adults of both sexes, all from the type locality and affording an unusual opportunity for the study of individual variation.

***Lutra canadensis nexa*, subsp. nov.**

NEVADA OTTER.

*Type.*—From near Deeth, Humboldt River, Elko County, Nevada. No. 210572, ♂ adult, skin and skull, U. S. National Museum (Biological

Survey collection), collected by R. F. Dietz, December 19, 1915. X-catalogue number 13275.

*Distribution*.—Humboldt and upper Snake River basins in southeastern Oregon, southern Idaho and northern Nevada, and probably adjoining western slopes of Rocky Mountains.

*Characters*.—A medium-sized, comparatively light-colored subspecies, with cranium broad, low, smoothly rounded and weakly developed. Color of type (winter pelage): Upper parts near mikado brown (Ridgway, 1912); in general tone, the tips of longer hairs somewhat lighter and producing an indistinctly grizzled effect; under parts overlaid with much lighter brown, paling gradually anteriorly to silvery grayish on throat, cheeks, and lips; feet light brownish; tail above about like back, somewhat paler below. Similar in general to *L. c. brevipilosus* of the lower Sacramento-San Joaquin River drainage, California, but apparently paler; skull more weakly developed, less angular; braincase usually lower and broader; postorbital processes of both frontals and jugals shorter and less prominent; mastoid processes less deflected downward, less hook-like; bullae and dentition about the same. Color paler and skull decidedly smaller, less angular, than in *L. c. pacifica* of the Cascade Mountain region of Washington; braincase similar in height, but skull differing otherwise in about the same details as from *brevipilosus*. Similar in size to *L. c. interior*, of Nebraska, but color paler and skull less angular; zygomata more slender; postorbital processes of frontals and jugals shorter, more weakly developed; audital bullae less inflated; dentition about the same. Resembling *L. c. sonora* of the Verde River drainage, Arizona, but skull less angular; postorbital processes shorter; lambdoid crest less developed (projecting and trenchant in *sonora*); audital bullae less inflated, less projecting below plane of basioccipital; maxillary tooth row longer; dentition, especially the upper molars, somewhat heavier.

*Measurements*.—*Skull of type*: Condylobasal length, 113.7 mm.; zygomatic breadth, 75; breadth of braincase (across mastoid processes), 71.2; height of braincase (over audital bullae), 42.6; postorbital constriction, 20.6; palatal constriction, 15.2; maxillary tooth row, 37.7; crown length (outer side) of upper carnassial, 12.6; crown width of upper carnassial, 10. An adult female from Humboldt River, near Golconda, Nevada: Condylobasal length, 111.4; zygomatic breadth, 70.7; breadth of braincase, 69; height of braincase, 40.6; interorbital breadth, 23.6; postorbital constriction, 21.4; palatal constriction, 14.4; maxillary tooth row, 37.6; crown length of upper carnassial, 12.3; crown width of upper carnassial, 9.3.

*Remarks*.—Coloration is not, as a rule, very dependable as a basis for distinguishing the subspecies of *L. canadensis*, but skins examined of the present form exhibit somewhat lighter brownish tones than of those inhabiting regions along the Pacific coast or farther east. The skull is characterized by weak development and lack of angularity as shown by the low lambdoid crest, slender zygomata and short postorbital processes.

*Specimens examined*.—Total number, 12, as follows:

Idaho: Birch Creek, 2 (skins and skulls); Bruneau, 1 (skin and skull); Hagerman, 1 (skin only); Sawtooth, 2 (1 skin and 1 skull).



Nevada: Deeth, 2 (1 skin and skull (type) and 1 skull only); Golconda, 3 (2 skins and skulls).

Oregon: Rome, Owyhee River, 1.

***Lutra canadensis texensis*, subsp. nov.**

TEXAS OTTER.

*Type*.—From 20 miles west of Angleton, Brazoria County, Texas. No. 156849, ♂ adult, skull only, U. S. National Museum (Biological Survey collection); collected by B. V. Lilly, March, 1908. X—catalogue number 7047.

*Distribution*.—Lower Mississippi River Valley in Louisiana and doubtless Mississippi, and west in the Gulf coast region at least to Bay City, Texas.

*Characters*.—A medium-sized, rather light brown subspecies, with short pelage and moderately broad skull. Color (topotype): Upper parts near verona brown (Ridgway, 1912), becoming somewhat lighter on top of head and neck; under parts a mixture of lighter browns, changing to silvery gray on throat and lips, this color extending upward over cheeks; feet near mikado brown; tail above like back, somewhat paler below. Resembling *L. c. interior*, but color apparently lighter, pelage shorter; skull very similar but mastoid processes less strongly turned downward; audital bullae distinctly less fully inflated, less projecting below level of basioccipital; dentition about the same. Compared with *L. c. vaga*, pelage similarly short, but color lighter brown; skull broader; braincase about equal in height, but decidedly broader, more rounded and inflated; basioccipital broader; palate broader behind molars; bullae less inflated; dentition nearly the same. Similar in size to *L. c. sonora* of the Verde River region, Arizona; skull more smoothly rounded, less angular; braincase more abruptly inflated behind postorbital constriction, as viewed from above; mastoid processes less strongly turned downward, less hook-like; basioccipital region more inflated, tending to bulge between bullae; bullae flatter, less projecting below level of basioccipital; maxillary tooth row longer; dentition decidedly heavier.

*Measurements*.—*Skull of type*: Condylbasal length, 112.3; zygomatic breadth, 73.8; breadth of braincase (across mastoid processes), 69.1; height of braincase (over audital bullae), 42.2; interorbital breadth, 24.6; postorbital constriction, 19.5; palatal constriction, 15.8; maxillary tooth row, 38; crown length (outer side) of upper carnassial, 12.8; crown width of upper carnassial, 9.9. An adult female topotype: Condylbasal length, 109.8; zygomatic breadth, 69.4; breadth of braincase, 66.3; height of braincase, 39.7; interorbital breadth, 24.1; postorbital constriction, 17.9; palatal constriction, 14.2; maxillary tooth row, 36.6; crown length of upper carnassial, 12.6; crown width of upper carnassial, 9.3.

*Remarks*.—*L. c. texensis* is closely allied to *L. c. interior* of Nebraska and *L. c. vaga* of Florida, and doubtless intergrades with both. It agrees with *vaga* in shortness of pelage, but skins examined are lighter colored; cranial details shown in skulls from northern Louisiana suggest a closer approach to *interior*.

*Specimens examined*.—Total number, 9, as follows:

Louisiana: Morgan City, 1; Tallulah, 4 (2 skins with skulls).

Texas: Angleton (type locality, 20 miles west) 3 (1 skin only); Bay City, 1 (skin and skull).

***Lutra mira*, sp. nov.**

PRINCE OF WALES ISLAND OTTER.

*Type*.—From Kasaan Bay, Prince of Wales Island, Alaska. No. 127888, ♂ young adult, skull only, U. S. National Museum (Biological Survey collection); collected by W. H. Osgood, May, 1903. Original number 2290.

*Distribution*.—Alexander Archipelago and probably adjacent mainland, southeastern Alaska.

*Characters*.—Size largest of the *L. canadensis* group. Color of an October specimen uniform vandyke brown (Ridgway, 1912) above, and near verona brown below, thinly overlaid with grayish on under side of neck and cheeks, becoming more distinctly gray on upper lip. Skull very large, the braincase broad, relatively low and flat; audital bullae very flat. Skull similar in general to those of *L. c. preblei* and *L. c. optiva*, but contrasting strongly in much greater size. Compared with *L. periclyzomæ*, of the Queen Charlotte Islands, a departure in combination of cranial characters is exhibited as follows: Size much larger; nasal region less depressed, the nasals shorter, less extended posteriorly beyond maxillae; incisive foramina narrower, less broadly oval; palate with a small, pointed posterior median projection (absent in *periclyzomæ*); outer side of upper carnassial less deeply emarginate.

*Measurements*.—*Skull of type*: Condylbasal length, 127.7 mm.; zygomatic breadth, 84.8; breadth of braincase (across mastoid processes), 80.1; height of braincase (over audital bullae), 42.2; interorbital breadth, 31.5; postorbital constriction, 19.6; palatal constriction, 16.1; maxillary tooth row (alveoli), 38.8; crown length (outer side) of upper carnassial, 13.1; crown width of upper carnassial, 9.7. Young female (nasal sutures open) topotype: Condylbasal length, 114.9; zygomatic breadth, 71.2; breadth of braincase, 71.1; height of braincase, 49.9; interorbital breadth, 26.7; postorbital constriction, 23.4; palatal constriction, 16; maxillary tooth row, 37.9; crown length of upper carnassial, 12; crown width of upper carnassial, 10.2.

*Remarks*.—*L. mira* differs so markedly in size from the known races of *L. canadensis* that in the absence of material indicating intergradation it seems best to treat it as a full species. Owing to the proximity of islands of the Alexander Archipelago to the mainland coast it may be expected to pass gradually into a more typical form of *canadensis*.

*Specimens examined*.—Total number, 5, all from Alaska as follows: Prince of Wales Island (type locality), 4 (including 1 skin and skull); Shrubby Island, 1.

***Lutra vancouverensis*, sp. nov.**

## VANCOUVER ISLAND OTTER.

*Type*.—From Quatsino, Vancouver Island, British Columbia. No. 137775, ♂ adult, skull only, U. S. National Museum (Biological Survey collection), collected by H. O. Bergh, 1905. X-catalogue number 5517.

*Distribution*.—Definitely known only from Vancouver Island.

*Characters*.—Skull large, very broad, angular and massive; mastoid process of squamosal widely extended and shelf-like. Not very unlike that of *L. c. pacifica* in general, but much broader and heavier, with broader braincase and more widely extended mastoid processes; basioccipital broader; audital bullae flatter, less extended below level of basioccipital; dentition heavier. Skull similar in length to that of *L. periclyzomae*, but much broader and more massive; nasal region less depressed, the nasals shorter, broader, less extended beyond ends of maxillae; mastoid process of squamosal forming a broad shelf extending farther laterally, but narrowing more rapidly along margin leading to lambdoid crest (as viewed from above); incisive foramina smaller, less broadly oval; audital bullae more rounded, less flattened; dentition much heavier, the outer side of upper carnassial less deeply excavated near middle. Contrasted with that of *L. c. eveza* the skull is much larger, broader, and more massive; braincase much broader and lower; audital bullae less inflated; dentition much heavier. Differing from *L. mira* notably in smaller size.

*Measurements*.—*Skull of type*: Condylbasal length, 120 mm.; zygomatic breadth, 89.8; breadth of braincase (across mastoid processes), 77.9; height of braincase (over audital bullae), 41.1; interorbital breadth, 29.1; postorbital constriction, 20.6; palatal constriction, 15.7; maxillary tooth row, 39.5; crown length (outer side) of upper carnassial, 13.3; crown width of upper carnassial, 10.4.

*Remarks*.—Among the members of the *L. canadensis* group *L. vancouverensis* is exceeded in size only by the geographically somewhat remote *L. mira* of Prince of Wales Island, Alaska. It is treated here as a full species, but may prove to intergrade with a mainland form. The upper part of a skull apparently picked up at the head of River Inlet, on the mainland of British Columbia, agrees closely with *vancouverensis* but circumstances suggest that the locality may be erroneous.

*Specimens examined*.—Three, all from the type locality.

PROCEEDINGS  
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A NEW NAME FOR THE ROCKY MOUNTAIN ELK.  
BY VERNON BAILEY.

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The geographic variation and subspecific characters of some of our best known large game mammals are less perfectly understood than in most of the groups of smaller mammals. This is due to the difficulty of getting together enough specimens of the larger species for comparison, to the scarcity of specimens from the early settled parts of the country, and to the crowded condition of our older museums where adequate collections of large mammals would take up more space than is available.

There are no good specimens of buffalo or elk from any part of the eastern United States or Canada in the museums of this country, and the finer distinctions of geographic differences in these groups will never be known unless some long forgotten specimens are found in Old World museums, or in caves, lake beds, marshes, or burial mounds in this country where skulls and skeletons have been more or less imperfectly preserved.

The first known form of the American elk or wapiti was described by Erxleben in 1777 as *Cervus elaphus canadensis*, from eastern Canada (probably the vicinity of Montreal), but there have been no wild native elk in eastern Canada or the extreme eastern United States for more than a century and apparently no specimens have been saved.

Other subspecies from farther west have since been described, the large dark colored *Cervus roosevelti*<sup>1</sup> Merriam from the Olympic Mountains in 1897; a large gray form, *Cervus merriami* Nelson, from Arizona in 1902; a small pale elk from the San Joaquin Valley, California, *Cervus nannodes* Merriam, in 1905; and a medium sized brown elk from northern Manitoba, *Cervus canadensis manitobensis* Millais in 1915.

The large light gray elk of the Rocky Mountains, from Alberta to northern New Mexico, has been called *Cervus canadensis* for want of a better name, but with the full knowledge that the name did not apply subspecifically. With this still abundant species I take pleasure in associating the name of the late E. W. Nelson, who has done so much to advance our knowledge of North American mammals.

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<sup>1</sup>The name *Cervus occidentalis* Ham. Smith, 1827, can not be shown to apply to any North American elk.

***Cervus canadensis nelsoni*, subsp. nov.**

*Type* from Yellowstone National Park, ♂ adult (8½ years old) No. <sup>12722</sup><sub>1245561</sub> U. S. Nat. Mus.; died September 21, 1904, in the National Zoological Park (No. 671¼); tanned skin in fresh early fall pelage, not the short summer nor the long coarse winter coat; complete skeleton and skull with antlers sawed off.

*General characters*.—Size large; antlers long with normally 6 points; hoofs four on each foot; upper canine teeth ovoid; tail a mere rudiment; metatarsal glands oval, about 3 inches long, above middle of metatarsus; lachrymal glands deep and sacklike; nose-pad mostly naked and roughened.

*Pelage in summer*, thin, short and harsh with little under wool; mane on top of neck and along throat little developed; in *winter coat*, hair long and coarse over body with dense under coat of fine soft brown wool; neck and throat manes long and coarse; ears silky; face and legs clothed with short stiff hairs; antlers shed annually, generally in March, renewed from permanent pedicels during summer, covered while growing with soft skin and a dense velvety brown coat of short hairs.

*Color*.—In *summer pelage*, body light buffy fawn color, fading to creamy buff or Jersey cow yellow; rump patch creamy buff or whitish; head, neck, legs, and belly dull rusty brown to dark umber and blackish; lips, chin, and leg stripes fulvous; eye rings buffy; center of metatarsal gland white in tawny area; nose pad, lips, eyelids, and hoofs black. In *winter*, body buffy gray over lavender, with dusky tips of coarse hairs that toward spring wear off and leave a creamy or soiled whitish body color; large rump patch, including stubby tail, whitish or later almost clear white; head and neck dull rusty brown with dark brown manes, darkest on lower throat; face and legs dark brown with buffy markings; ears dull light brown lined with pale buff.

*Fawns*.—Body dark rich fawn color or pale tawny, with two lines of whitish spots from ears to rump patch and irregular spots over sides from shoulders to hips; legs dull fulvous; head and neck tawny with dusky on ears, nose, chin, and throat and along line of belly; rump patch cinnamon; inside of ears and metatarsal spot white; hoofs black with yellow tips.

*Cranial characters*.—Skulls of adult bulls from Yellowstone Park are heavy, thick and angular for support of heavy antlers and for great fighting strength. Canine teeth in upper maxillary oval or rounded, half to three-quarters of an inch in diameter, pointed when unworn, triangular but usually flattened and worn off at crown. In the adult female the skull, without antlers, is large but relatively thin and light with canine teeth half the size of those of the males.

*Measurements* of skull of an adult bull (171889) from Yellowstone Park: basal length, 430; nasals, 170; upper molar series, 140; mastoid breadth, 165; zygomatic breadth, 200; exorbital breadth, 210; rostrum at canines, 90; antlers over beam, right 1260, left 1250; spread of beams, 1000; of tips, 920 mm. Skull of adult cow elk from Yellowstone Park (115137): basal length, 410; nasals, 170; upper molar series, 140; mastoid breadth, 150; zygomatic breadth, 180; exorbital breadth, 195; rostral breadth across canines, 80 mm.



*Remarks.*—Except for the dwarf elk of California this seems to be the palest of all the North American elk. Both *merriami* and *manitobensis* are described as darker colored and *roosevelti* is much darker. The eastern elk was described by Erxleben in 1777 as rusty gray in summer and buffy gray in winter; by Pennant in 1784 as reddish brown in color; by DeKay in 1842, as in spring reddish brown, changing in summer to yellowish brown, to buff in autumn, and gray in winter. Audubon and Bachman in 1851 described the elk from Pennsylvania as in winter with head and neck dark brown, body dark gray. Audubon's colored plate of the Pennsylvania elk in a summer landscape shows them in rich tawny colors over most of the body, indicating a much brighter, richer colored animal than any of our western forms.





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NEW VELIIDAE (HEMPITERA) FROM CENTRAL  
AMERICA.

BY C. J. DRAKE AND H. M. HARRIS.

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This paper contains the descriptions of three new species of *Velia* Latreille and one *Rhagovelia* Mayr from Central America. The disposition of the types is given beneath the description of each species.

*Velia virtutis*, n. sp.

Moderately large, robust. Chocolate brown, prettily marked with white and bluish; clothed with golden pubescence. Head dark, with the usual impressed lines. Eyes dark red. Antennae long, slender, moderately clothed with dark hairs, segment I moderately stout, slightly curved, much stouter than others; proportions, 40 : 46 : 46 : 41. Rostrum stout, brownish, the basal segments paler, the tip shining black, reaching to metasternum. Legs moderately long and slender, brown, conspicuously marked with white; acetabula strongly pitted. Legs with coxae, trochanters, basal half of femora, an indistinct ring before apex of femora, another near base of tibiae, a narrow band at middle of tibiae and most of second segment of middle and hind tarsi white. Anterior tarsi with first segment short and slender, third as long as the two preceding. Intermediate legs with first tarsal segment very short, second long, a little longer than third. Hind legs with first tarsal segment slightly shorter than second, third longest, the femora with numerous fine, blackish, denticulations in a wide irregular row on hind margin of apical half, the tibiae also finely denticulate within.

*Winged form.*—Pronotum strongly developed, strongly, coarsely pitted, behind strongly roundly produced, brown at apex, in front with a white spot on each side, humeri prominent. Hemelytra chocolate brown, an elongate oval spot at the base and three oval ones near the apex white; with four elongate spots opposite base of pronotum and six irregular spots on disc of membrane bluish, silvery between the segments. Male claspers long, narrow, moderately curved, somewhat tapering. Last genital segment beneath on each side where clasper emerges with its margin excavated and then produced into a blunt point. Last venter distinctly, transversely impressed, the hind margin deeply roundly excavated. First genital segment swollen along median line, the hind margin broadly roundly produced.

*Female.*—Markings as in male. Last venter not excavated behind.

*Length*, 5.50–6.00 mm.; width at humeri, about 2 mm.

*Holotype*, winged male, Barro Colorado Island, W. C. Allee; *allotype*, female, taken with type, U. S. National Museum. *Paratypes*, two females, Tobago Island, Panama, Aug. 6, 1934, L. Rozeboom, and one female, Port Sherman, Canal Zone, R. C. Shannon, Sept. 6, 1923.

This is a very striking *Velia*. The white markings on the legs are somewhat variable in character as are also the wing spots. The writers had questionably identified this species as *virgata* White but were informed by Dr. H. B. Hungerford that it is very distinct and not easily confused with *virgata*, the type of which he examined in Europe.

#### ***Velia recens*, n. sp.**

Brown, the hemelytra with a large elongated spot near the base and a shorter, obovate one near the apex white, the sides of pronotum in front with a whitish luster. Head with usual impressed lines. Eyes reddish brown. Antennae brownish, moderately hairy. First segment curved, enlarged toward apex; proportion of segments, 28 : 18 : 24 : 26. Pronotum not very tumid above, coarsely pitted, rather sharply rounded behind, the median carina distinct in front. Connexiva concolorous. Rostrum extending almost to end of mesosternum. Legs rather stout, moderately long, dark brown, the coxae, trochanters and basal portion of femora yellowish brown.

*Male*.—Slightly smaller than female. Last segment of venter roundly excavated behind but not distinctly notched at the middle. Clasper slightly tapering from the base, curved, the apex faintly recurved.

*Female*.—Slightly stouter than male. Very similar in color and markings. *Length*, 4.41 mm.; width, 1.56 mm.

*Holotype*, winged male, Monte Sirio, Gatuneillo River, Canal Zone, Panama; *allotype*, female, Porto Bello, Panama, authors' collection.

This species has somewhat the coloration of *V. myseri* Hungerford but is readily recognized by its size, proportions, and male clasper.

#### ***Velia egregia*, n. sp.**

Moderately large, robust, brown, legs annulate with paler markings. Head with usual impressed markings. Antennae, brown, long, slender, clothed with numerous long hairs, the first segment only slightly enlarged, moderately curved; proportions, 56 : 38 : 40 : 37. Legs densely clothed with long hairs, brown; coxae, trochanters, basal part of all femora, a broad band near the middle of each tibia, and most of femora beneath pale yellowish-testaceous, also a narrow indistinct ring near apex of femora and on base of tibiae of all legs.

*Winged form*.—Pronotum dark brown, coarsely pitted, moderately swollen, humeri moderately prominent; median carina fairly distinct. Hemelytra with a large elongate spot near the base and three spots near the apex white. Connexiva with silvery spots between the segments, these indistinct basally.

*Wingless form*.—Pronotum much shorter, broadly rounded behind, the basal half darker. Connexivum very broad, brown, with silvery spots as in winged form. Dorsum brownish black, the last three segments with a silvery luster.

*Male*.—Clasper short, stout at base, strongly curved, forming a somewhat hook-like structure. Last venter deeply roundly excavated on hind margin.

*Female*.—Slightly stouter than male. Abdomen truncate behind.

*Size*.—Length, 5.31 mm.; width, 1.85 mm.

*Holotype*.—Winged male, Panama, Oct. 28, 1934, and *allotype*, winged female, Las Gracias, Panama, Feb. 25, 1935, collected by Dr. L. Rozeboom, collection of authors. *Paratypes*, apterous male, Juan Dica, Panama, Feb. 2, 1935, L. Rozeboom; apterous female, La Caja, San Jose, Costa Rica, 1934, Schmidt (Vienna Museum) and apterous male and female taken with *allotype*. Belongs to the *stagnalis* group of the genus and recognized by the shape of the claspers.

***Rhagovelia panda*, n. sp.**

Moderately large, blackish, thickly clothed with golden pubescence. Antennal formula, 54 : 34 : 30 : 26; first and second segments with a few bristly hairs, the first with basal half yellowish. Rostrum extending on basal portion of mesosternum.

*Apterous form*.—Pronotum long, indistinctly carinate, broadly rounded behind; in front broadly yellowish.

*Winged form*.—Pronotum broadly yellowish in front as in apterous form, indistinctly carinate, triangularly produced behind, the humeri prominent.

*Male*.—Hind femora strongly developed, in some individuals enormously enlarged, armed beneath with numerous irregularly placed, black teeth of various sizes. Coxae, and trochanters, the femora beneath and base and sides within yellowish white. Intermediate tarsi with segment III longer than II (35 : 47). Hind tibiae nearly straight or strongly curved, denticulate beneath, armed at apex with straight spur and before apex usually with three large, stout teeth. Connexiva yellowish white, the narrow margin and a broad basal stripe above blackish. Venter with a very prominent median carina extending to last segment, distinctly impressed on each side of carina; last segment yellowish, scarcely excavated behind. Clasper long, narrow, slightly curved, faintly narrowed towards apex.

*Female*.—Color markings about as in male. Hind femora moderately swollen, with a large curved tooth just before middle, thence to apex with two rows of shorter black teeth; hind tibia nearly straight, finely denticulated.

Length, 4.90–6.00 mm.; width, 2.00 mm.

*Holotype*, apterous male; *allotype*, winged female, and *paratypes* several apterous and macropterous males and females, Chiquimula, Guatemala, June, 1930; authors' collection.

The authors desire to express their appreciation to Mr. W. E. China of the British Museum for comparing this species with the type of *R. femoralis* Champion. The clasper is longer and narrower at the base than in *femoralis*. The last segment of the intermediate tarsi is slightly longer than the second. The venter, in some specimens, is mostly yellowish, also the coxae and trochanters. The hind trochanters are armed with two or three short teeth in the male.



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NEW GECKOS OF THE GENUS *LYGODACTYLUS*  
FROM SOMALILAND, SUDAN, KENYA,  
AND TANGANYIKA.

BY ARTHUR LOVERIDGE.

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Recently, as a fellow of the John Simon Guggenheim Foundation, I was enabled to visit Kibwezi, Kenya Colony, the type locality of *Lygodactylus fischeri scheffleri* Sternfeld (1912, Wiss. Ergeb. der Deut. Zentral-Afrika-Exped. 1907-1908, 4, p. 206), the smallest gecko of the whole genus. Though I failed to procure topotypes, I collected a male in the gallery forest fringing the Voi River eighty miles away. This specimen undoubtedly represents *scheffleri*, hitherto known only from the two types.

The vicissitudes through which the name has passed are many, even including being synonymized with *fischeri* Boulenger, 1890, of Sierra Leone and Cameroon! I might state, however, that its broad, blunt snout immediately shows that it has little close relationship with the narrow, acuminate-snouted *fischeri*.

In endeavouring to straighten out the contradictory tangle of opinions revolving about *scheffleri*, I became involved in a complete revision of the whole genus. The present paper deals with certain undescribed but recognizable forms which have come to my notice during this investigation.

In 1932, Mr. H. W. Parker (Proc. Zool. Soc. London, p. 302), with considerable misgivings, tentatively referred certain geckos from British Somaliland to *scheffleri*, which he made a race of *capensis*, correctly recognizing their affinities with both. I have now to thank him for generously placing this material at my disposal for study.

This material came from two districts, those from one locality agreeing with *ocellatus*, *thomensis* and the *picturatus* group in having an entire mental, those from the other locality agree with *capensis*, *scheffleri* and *fischeri* in having a deeply fissured mental. So closely similar are both series in all other characters, however, that they undoubtedly represent one species, yet so constant have I found these characters of the mental in



some hundreds of *Lygodactyli* examined that I am forced to suggest a racial name for those with a deeply fissured mental. In brief, these Somaliland geckos appear to me to represent one fairly primitive, but divergent, species, in which the two median rows of the subcaudals are transversely enlarged.

Since penning the foregoing paragraphs, I have had the opportunity, through the generosity of Dr. G. Scortecci of the Milan Museum, to examine 17 specimens of this group from Italian Somaliland. Of these 16 agree with the Buran, British Somaliland material, in having a deeply fissured mental. One of two geckos from Bera, I. S., however, agrees with the typical form. It should be noted that Buran is nearer to the border of Italian Somaliland than is Bar Madobe, Nogal Valley, British Somaliland, whence come the typical form for which I propose the name:

***Lygodactylus somalicus somalicus*, sp. nov.**

*Type*.—Museum of Comparative Zoölogy, No. 35,558. An adult ♂ from Bar Madobe, Nogal Valley, 2,300 feet, British Somaliland, collected by Lieut. R. H. R. Taylor, R. A., in 1929–1930.

*Paratypes*.—Two males and four females in the Museum of Comparative Zoölogy (No. 35,559) and British Museum Nos. 295–299), with the same history as the type.

*Diagnosis*.—By having the two median rows of subcaudals transversely enlarged, the new species differs from *capensis* of South and East Africa; by color pattern, size, and having its supranasals separated by 3 granules in 86% (2 granules in only one of the seven types), it differs from *scheffleri* of Kenya Colony, which has the supranasals in contact, also from *conradsi* of Tanganyika Territory in 92% of which the supranasals are separated by a single scale, in 8% they are in contact. The blunt, broad snout of *somalicus* immediately distinguishes it from the long-snouted *fischeri* of West Africa.

*Description*.—Upper labials 6–6 (range 6–7, average 6 for 14 counts); lower labials 6–6 (range 5–6, average 6 for 14 counts); nostril placed above the suture between rostral and first upper labial, between the rostral, first labial and 2 nasals (sometimes slightly separated from the postnasal by a narrow rim resulting from an upward prolongation of the first labial); supranasals separated by 3 (except in one specimen which has only 2) granules; mental entire but deeply concave posteriorly to accommodate a large postmental which is followed by 3 smaller ones; preanals 6 (in all three males); two median rows of subcaudals transversely enlarged.

*Coloration*.—In alcohol. ♂ type. Above, ashy brown; a slightly darker area forming a broad, though indistinct, vertebral band which narrows and deepens to form a distinct line upon the tail; a dark streak from the nostril, through the eye to the fore arm, in some specimens more or less continuous along the flanks. Below, pure white, immaculate.

*Measurements*.—The ♂ type measures 50 (25 + 25) mm., a ♀ paratype (M.C.Z. 25,559) 52 (30 + 22) mm., the tail in process of regeneration.

*Range*.—From the type locality in the Nogal Valley southeast to Bera

(Beira), Italian Somaliland, where it meets with the eastern form, which may be called:

***Lygodactylus somalicus annectens*, subsp. nov.**

*Type*.—British Museum, No. 268. An adult ♀ from Buran District, 3,100 feet, British Somaliland, collected by Lieut. R. H. R. Taylor, R. A., in 1929–1930.

*Paratype*.—British Museum, No. 270, of the same sex and history as the type, also seven males and nine females in the Milan Museum (Nos. 268, 270, 1040, 1248–50) from the following localities in Italian Somaliland (from north to south): Bera (Beira); Rocca Littoria; Garoe; Aroe near Obbia; Villa Duca d'Abruzzi near Mogadish; Gelib-Bidi on the Juba River, collected by Dr. G. Scortecchi and Signor U. Fiechter in 1930 and 1931.

*Diagnosis*.—Differs only from the typical form in that the mental is deeply fissured, not forming a large postmental; a character which is constant and diagnostic in all other members of the genus.

*Description*.—Upper labials 7–6 (range 6–9, average 7 for 36 counts); lower labials 6–7 (range 6–9, average 7 for 36 counts); supranasals separated by 1–4 granules (usually 2); mental deeply fissured posteriorly, the fissures not uniting to cut off a large postmental, however.

*Measurements*.—The ♀ type measures 53 (27 + 26) mm., the largest ♂ (which is from Villa Duca d'Abruzzi) measures 61 (29 + 32) mm., several ♀ ♀ (from this locality) are about 56 (30 + 26) mm.

*Remarks*.—It will be noted that there are certain average differences which may not hold when larger series are available, thus the typical form averages 6 upper and 6 lower labials and usually 3 granules between the nasals. The race *annectens* averages 7 upper and 7 lower labials and usually has 2 or 1 granules separating the nasals, only the Garoe gecko has more than 2, having 4 such granules.

*Range*.—From the type locality in the Buran District, on the British-Italian boundary between 10° 5' N. and 10° 50' N., eastwards and southwards throughout Italian Somaliland.

***Lygodactylus picturatus sudanensis*, subsp. nov.**

*Type*.—Museum of Comparative Zoölogy, No. 8,800. An adult ♂ from Abu Zor, Senaar, Anglo-Egyptian Sudan, collected by Dr. Glover M. Allen, 1913.

*Paratypes*.—Four males and three females in the Museum of Comparative Zoölogy and the British Museum as follows: M.C.Z. Nos. 8,799 and 8,801 with the same history as the type; No. 8,796 from El Mesherrat, Senaar; No. 8,802 and Brit. Mus. No. 1908–5–19–7 from Roseires, Blue Nile, Senaar, collected by Dr. G. M. Allen and Major S. S. Flower, respectively; Brit. Mus. No. 1927–8–13–16 from Singa, Blue Nile, Senaar, also collected by Major S. S. Flower; Brit. Mus. No. 1907–10–24–4 from between Wau and Chak Chak, Bahr el Ghazel Province, Sudan, collected by Mr. A. L. Butler.

In addition, a female, Milan Museum, No. 1,200, from Cunama, Eritrea, which conforms to the Sudan specimens in all respects but whose scale counts are not included in the following description.

*Diagnosis*.—Differs from all other described races of *picturatus* in the conspicuous black median streak on the throat of the male which is fused with an inner  $\cap$ -shaped marking, uniting, or just failing to unite it with the outer  $\cap$ -shaped marking, and usually fused with a posterior basal patch or blotch which rarely retains any resemblance to the third chevron of *L. p. gutturalis* (Bocage). Throat of female immaculate white.

*Description*.—Upper labials 6–7 (range 6–9, average 7.4 for 16 counts); lower labials 6–6 (range 6–8, average 6.5 for 16 counts); nostril between the first upper labial and 3 (range 2–3) nasals, frequently separated from the lower postnasal by a narrow rim resulting from an upper prolongation of the first labial; supranasals separated by 2 (range 1–3) granules (or by an upward and backward prolongation of the rostral in the Singa gecko); mental entire; postmentals 3 (except in one specimen which has only 2 and another with 4); preanal pores 7 (range 7–8, only one of the 5 males has 8).

*Coloration*.—In alcohol. ♂ type. Above, uniformly pale olive, a burnt sienna (or black) line from nostril through eye to the flank where it terminates behind fore arm by giving off one or two spots; a second, but shorter, line from the commissure of the mouth; a black spot on the middle of the snout; an undulating transverse bar across the forehead connecting the orbits anteriorly; two or three more or less parallel series of short, longitudinal, brown streaks on the occiput, nape and anterior portion of back; the outermost black chevron of the throat extends backwards and upwards to above the base of the fore arm. Below white, the throat with black markings as described in the diagnosis.

*Measurements*.—The ♂ type measures 66 (34 + 32) mm., but is surpassed in body length by 3 mm., in tail length by 4 mm., by two others. The ♀ paratypes measure 36, 34 and 33 mm. from snout to anus, their tails being regenerated or missing.

#### ***Lygodactylus picturatus mombasicus*, subsp. nov.**

*Type*.—Museum of Comparative Zoölogy, No. 30,590. An adult ♂ from Kilindini, Mombasa Island, Kenya Colony, collected by Arthur Loveridge, October 28, 1929. (Cf. coloured figure of type in Bull. Mus. Comp. Zoöl., 1933, **74**, pl. i, fig. 2.)

*Paratypes*.—Museum of Comparative Zoölogy series of 34 males and 29 females from Kilindini (12); Frere Town (8); Golbanti (3); Ngatana (30); Witu (4); Lamu Island (2); Manda Island (1); Guaso Nyiro Plains and vicinity (3). All in Kenya Colony.

*Diagnosis*.—Differs from *L. p. picturatus* of Zanzibar Island and Tanganyika in its head and shoulders being white, instead of bright mustard-yellow, typically (*i. e.* along the coast northwards from Mombasa and not in the area of intergrades westwards from Mombasa to Kibwezi) the black markings on head and shoulders are strikingly different.

Differs from *L. p. ukerevensis* of Ukerewe Island and southwestern

Kenya in its more slender habit, unspotted labials which at most have only their buccal edges tipped with brown, absence of a dorso-lateral series of ocelli.

Differs from *L. p. gutturalis* of northwestern Kenya and Portuguese Guinea in the absence of gular chevrons, the throat of the male of *mom-basicus* being normally entirely black.

*Description*.—Upper labials 7-7 (range 7-10, average 8.0 for 118 counts); lower labials 7-7 (range 6-9, average 6.8 for 118 counts); nostril between the first upper labial and 3 (rarely 2) nasals, frequently separated from the lower postnasal by a narrow rim resulting from an upward prolongation of the first labial; supranasals separated by 2 (range 1-2 in the ratio of 35 to 25) granules; mental entire; postmentals 3 (except in two specimens which have only 2); preanal pores 10 (range 7-11, average 8.8 for 34 males).

*Coloration*.—In alcohol. ♂ type. Above, faintly bluish-white on head, a broad black band from nostril narrowing to eye, broadening behind eye and continuing to shoulder, a finer line on edge of lips extends from angle of mouth to, and along, fore arm; an M-like mark between eyes, another resembling two fused blotches on occiput (commonly fused to form a gridiron-like pattern), a third mark on nape with down-pointing prolongations which unite with the lateral band first mentioned; another pair of blotches, slightly fused anteriorly, on back; two series of dusky blotches along either side of the vertebral line of the dorsum (at Ngatana and Kibwezi fused to form conspicuous black and well-defined dorsolateral bands) which is olivaceous grey; tail bluish-grey. Below, white, throat (which is normally entirely black in males) with a black chevron-shaped band following the outline of the jaws and extending backwards, as a pair of lines, almost to the axilla, this outer chevron-shaped mark fused anteriorly with an inner chevron-shaped mark. In females these chevrons are wholly absent or may be faintly represented.

*Measurements*.—The ♂ type measures 80 (39 + 41) mm., and is only surpassed by one other with a tail a millimetre longer. The largest ♀ ♀ (M.C.Z. 18537, 18539) measure 67 (37 + 30) mm.

***Lygodactylus picturatus ukerewensis*, subsp. nov.**

*Type*.—Museum of Comparative Zoölogy, No. 30,542. An adult ♂ from Ukerewe Island, Lake Victoria, Tanganyika Territory, collected by Arthur Loveridge, June 10, 1930.

*Paratypes*. Museum of Comparative Zoölogy series of 34 males and 14 females with same data as type, but collected June 10-12, 1930, also a pair (♂, ♀) from Loita Plains, southern Masai Reserve, Kenya Colony, at 7,000 feet, collected by C. P. Curtis in 1923.

*Diagnosis*.—No yellow coloring; snout black, crown of head white heavily marked with black, frequently a cruciform marking in prefrontal region, at least a longitudinal streak; a prominent series of dorsolateral ocelli. Below, males with black throats, the black prolonged posteriorly to level of forearms as lines or vermiculations, sometimes a light  $\cap$ -shaped patch separating the black chin patch from a black posterior area.

*Description*.—Upper labials 7-7 (range 6-9, average 6.99 for 104 counts);

lower labials 6-6 (range 5-7, average 6.15 for 104 counts); nostril between the first upper labial and 3 (rarely 2) nasals, frequently separated from the lower postnasal by a narrow rim resulting from an upward prolongation of the first labial; supranasal separated by 2 (range 1-3 in the ratio of 15-34-2) granules; mental entire; postmentals 3 (except in two specimens, one of which has 2, the other 4); preanal pores 7 (ranges 6-9, average 7.5 for 34 males).

*Coloration*.—In alcohol. ♂ type. Above, grey, a tranverse white band across the head from in front of ear, through eye, across prefrontal region, rest of head mottled and marbled with black; a dorsolateral line of black-edged ocelli; three rows of interrupted, but conspicuous black stripes on side of head and neck, one from the gular patch continuing on to fore arm. Throat black, posteriorly with four indentations of white from the breast; rest of undersurface white except for a dusky line along the underside of tail.

*Measurements*.—The ♂ type measures 90 (42 + 48) mm., the largest ♀ paratype (M. C. Z. 30544) measures 74 (37 + 37) mm.







PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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THE TAXONOMY OF THE ANOPLURAN GENERA  
POLYPLAX AND EREMOPHTHIRIUS, INCLUD-  
ING THE DESCRIPTION OF NEW SPECIES.

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The anopluran genera *Polyplax* Enderlein and *Eremophthirius* Glinkiewicz are very closely related. Together they constitute a natural group of the subfamily Hoplopleurinae, family Haematopinidae, which parasitize exclusively hosts of one family of rodents, the Muridae, and of one family of insectivores, the Soricidae. The group is widely distributed, being found on all continents except Australia. It is best represented in Africa, where 16 species are known.

The occurrence of species of *Polyplax* on shrews (Soricidae) is of special interest. A number of such records have been made; yet for only one species is there convincing evidence that shrews are the true hosts. There are many records of the occurrence of *Polyplax reclinata* (Nitzsch) on shrews in Europe and Asia, and no records of this species from other kinds of hosts. These shrews belong to four different genera and are widely distributed.

This shrew-infesting louse is so near to the type species that it is distinguished from the latter only by very trivial, yet constant, characters. Its unusual host relationship, therefore, is not associated with any unusual morphological character. Its characters are unmistakably those of a murid-infesting louse, of lice that evidently evolved on and with murid rodents. We have no evidence that *Polyplax* evolved upon insectivores. Lice of insectivores, as far as known, are of a type quite different from *Polyplax*. Thus we are forced to conclude that not very far back in geological history the ancestor of *Polyplax reclinata* must have "bridged the phylogenetic gap" between murid rodents and insectivores, in crossing over from hosts of the former group to those of the latter.

TAXONOMIC VALUE OF THE THIRD ANTENNAL SEGMENT  
OF THE MALE IN *POLYPLAX* AND *EREMOPHTHIRIUS*.

The writer wishes to point out the taxonomic value, in the genera *Polyplax* and *Eremophthirius*, of the third antennal segment of the male. In striving to clear up some of the involved synonymy, recourse was had to the chaetotaxy and morphology of this segment. A study of the males at hand, which represent more than half of those known, shows that the maximum number of setae is six. It also shows that this is the typical number. These setae have been named (fig. 1) and their positions shown for the species *Polyplax spinulosa* (Burmeister). It is also noted that the apical spine and the general shape of the segment are of equal taxonomic importance.

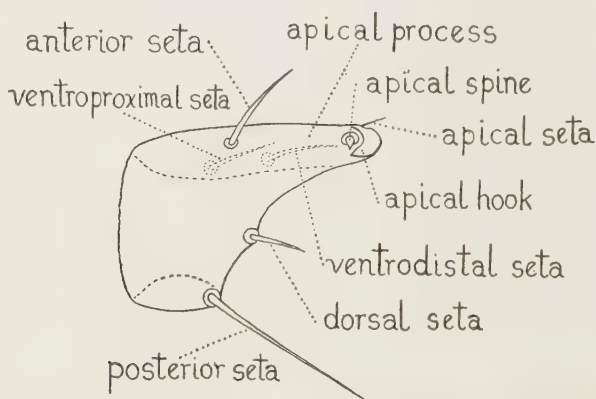


FIG. 1.—Dorsal view of the third antennal segment of male of *Polyplax spinulosa* (Burmeister).

While this third antennal segment lends itself excellently to specific differentiation, nowhere in the literature can a description of it, or any mention of its chaetotaxy, be found. In fact, in our most up-to-date descriptions it seldom is mentioned at all, and in our recent outline drawings of sucking lice, of which we have many good ones, usually no setae are shown on this segment, and even the apical spine and hook frequently must be searched for in vain. The writer believes that a careful description of this segment is of more importance in the identification of a species than that of any other structure unless it be the male genitalia. By all means future descriptions of species of *Polyplax* and *Eremophthirius* should include a description of the third antennal segment of the male.

CHAETOTAXY AND TERMINOLOGY OF THE THIRD  
ANTENNAL SEGMENT OF THE MALE.

The modification of the third antennal segment in the male louse consists fundamentally in the development of an apical process armed with a spine.

This process, known as the *apical process*, consists of an extension distally of the anterior or anterodorsal part of the segment. Above, near the tip of this process, is a spine, the *apical spine*, which in different species varies much in size, shape, and position. In a generalized type of segment, such as that of the male of *Polyplax spinulosa*, six setae are always present. The most conspicuous of these is the one on or near the posterior margin, which may be termed the *posterior seta*. On or near the front margin is another, less conspicuous, seta, the *anterior seta*. Above, more commonly near the distal margin, is a medium-sized seta, the *dorsal seta*. On the underside of the third antennal segment, usually nearer the anterior margin than the posterior margin, are two setae. The more proximal may be called the *ventroproximal seta*, and the more distal the *ventrodistal seta*. Finally, in most species there is a very minute seta, the *apical seta*, at the apex.

These six antennal setae may be detected in most of the known species of *Polyplax*, but some of them are lacking in a few species. Moreover, these setae are found to vary much in size and position, a fact which makes them admirably suited for specific differentiation.

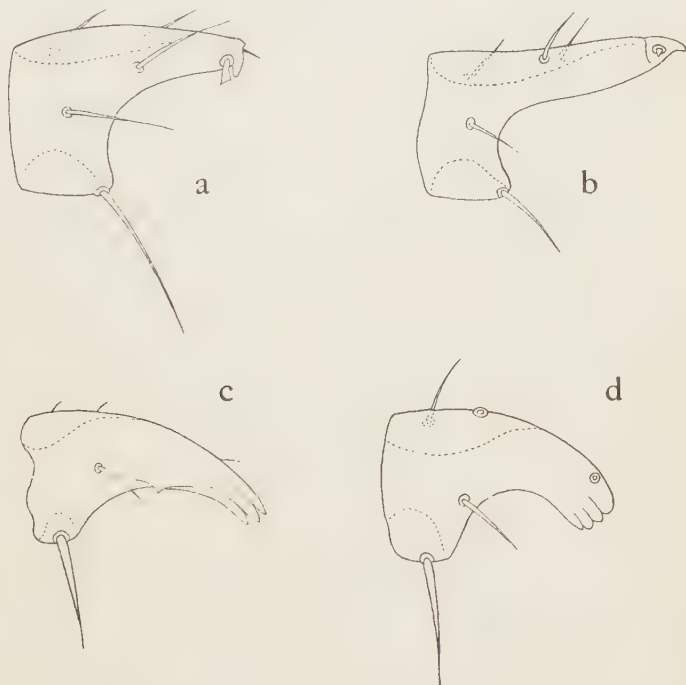


FIG. 2 — Dorsal views of third antennal segment of the male of three species of *Polyplax* and one of *Eremophthirius*; a, *P. alaskensis* Ewing; b, *E. eropepli*, new species; c, *P. dentaticornis*, new species; d, *P. tarsomydis*, new species.

Of equal importance with the chaetotaxy of the third antennal segment of the male is the shape of the apical process, and probably most important of all are the size and shape of the apical spine. The apical process is absent in a few species. Usually it is more or less curved, probably reaching the extreme of this condition in *tarsomydis*, new species (fig. 2, *d*), although in some species, as in *eropepli*, new species (fig. 2, *b*), it is straight.

The apical spine varies much in size and shape, but not much in its position. More commonly it has the shape of a stout, but very short and sharp, spine. It has this shape in the species *spinulosa* (fig. 1). In several species this spine is flattened and truncate distally, as in *alaskensis* (fig. 2, *a*). In some it is absent, as in *dentaticornis*, new species (fig. 2, *c*).

#### KEY TO THE SPECIES OF *Polyplax* ENDERLEIN.

1. Third antennal segment of male without apical process; endomere (of male genitalia) very broad, pseudopenis Y-shaped, parameres usually short, incurved, not articulating distally with base of pseudopenis.....*oxyrrhynchus* group, 4  
 Third antennal segment of male with apical process, or conspicuous apical spine; male genitalia of a different type.....2
2. Paratergal setae situated between the two posterior corners of the paratergal plate.....3  
 Paratergal setae situated at the two posterior corners of the paratergal plate; anterior tergite of a typical abdominal segment of female larger than posterior tergite. Occurring in Africa.....*arvicantis* group, 22
3. Parameres (of male genitalia) long, freely projecting, clasper-like, not articulating distally with base of pseudopenis; tergites usually large, first tergite of typical abdominal segment of female usually larger than second. Confined to Africa, except for one species.....*otomydis* group, 7  
 Parameres greatly reduced, never clasperlike, usually articulating distally with base of pseudopenis.....*spinulosa* group, 12
4. Sternum without anterior median process; ventral endomere of male genitalia absent or poorly developed.....5  
 Sternum with anterior median process; ventral endomere of male genitalia well developed, with conspicuous lateral processes extending beyond the sides of the parameres.....  
*P. calva* (Waterston)
5. Typical paratergal plates with a cusplike projection at each posterior angle; sternum broader than long. Occurring in Asia.....6  
 Typical paratergal plates with a cusplike projection only at the posteroventral angle; sternum longer than broad. Occurring in Africa.....*P. oxyrrhynchus* Cummings
6. Abdominal tergites of female present; tips of parameres of male genitalia but slightly incurved.....*P. insulsa* Ferris  
 Abdominal tergites of female absent; tips of parameres of male genitalia strongly incurved.....*P. asiatica* Ferris

7. Forehead typical of the genus, being a low cone; body of a shape typical of the genus; tergal setae setiform. Occurring in Africa and the New World.....8
- Forehead greatly reduced or almost obliterated; body long and slender; tergal setae frequently enlarged or flattened. Occurring in Africa.....11
8. Anterior tergite of a typical abdominal segment of the female larger than the posterior tergite.....9
- Tergites small and of the same size on a typical abdominal segment of the female.....*P. jonesi* (Kellogg and Ferris)
9. Sternum with anterior median process. Occurring in Africa.....10
- Sternum without anterior median process. Occurring in America  
*P. auricularis* (Kellogg and Ferris)
10. Tergites of female reaching about two-thirds the distance across the abdomen; pseudopenis sharp, similar distally to one of the parameres.....*P. otomydis* (Cummings)
- Tergites of female not reaching half way across the abdomen; pseudopenis stouter distally than one of the parameres.....  
*P. cummingsi* (Ferris)
11. Posterior legs greatly enlarged and of the same size in the two sexes; some of the tergal setae spatulate or lanceolate; integument somewhat scaled.....*P. brachyrrhynchus* (Cummings)
- Posterior legs of male only greatly enlarged; none of tergal setae spatulate, although some are enlarged.....*P. phthisica* (Ferris)
12. Sternum with anterior median process.....13
- Sternum without anterior median process.....15
13. Two posterior lobes (cusps) of typical paratergal plates small, subequal.....14
- Ventral lobe of each typical paratergal plate fully twice as large as dorsal and equaling or surpassing in length the ventral paratergal seta.....*P. gerbilli* Ferris
14. Lobes on paratergal plates distinct, cusplike; terminal spine of modified antennal segment of male present.....*P. chinensis* Ferris
- Lobes on paratergal plates greatly reduced, vestigial; terminal spine of modified antennal segment of male absent.....  
*P. tarsomydis*, new species
15. Typical paratergal plates with two cusplike lobes.....16
- Typical paratergal plates with but one lobe, which is cusplike.....21
16. Lobes (cusps) of typical paratergal plates simple (or nearly so), shorter.....17
- Lobes of typical paratergal plates serrate, longer.....20
17. Front margin of sternum broadly rounded, sides rounded.....  
*P. serrata* (Burmeister)
- Front margin of sternum not broadly rounded, sides straight, parallel.....18
18. Sternum angulate posteriorly.....*P. praomydis* Bedford
- Sternum produced posteriorly into a broadly rounded or truncate process.....19



19. Paratergal plates of seventh abdominal segment with lobes.  
Occurring in Europe and Asia.....*P. reclinata* (Nitzsch)  
Paratergal plates of seventh abdominal segment without lobes.  
A circumpolar species.....*P. alaskensis* Ewing
20. Lobes on paratergal plates inconspicuous, never as much as one-third the length of plate bearing them; modified antennal segment of male curved, hornlike, trifurcate distally and without terminal spine and terminal seta. Occurring in China  
*P. dentaticornis*, new species
- Lobes on paratergal plates long, conspicuous, some of them almost as long as plate bearing them; modified antennal segment of male not hornlike, not trifurcate, and with terminal spine. Occurring in Africa.....*P. waterstoni* Bedford
21. Temporal regions of head somewhat quadrangular, the post-antennal and posterolateral angles being but little rounded  
*P. spinulosa* (Burmeister) and *P. spinigera* (Burmeister)  
Temporal regions of head not quadrangular, the postantennal and posterolateral angles being somewhat rounded.....  
*P. gracilis* Fahrenholz
22. The tergites of a typical abdominal segment of female equal in their transverse dimensions and each extending about three-fourths the distance across the segment; posterior emarginations of typical paratergal plates deep.....*P. arvicanthis* (Bedford)  
The two tergites of a typical abdominal segment of female of unequal transverse dimensions, the first being shorter than the second, and neither extending more than half the distance across the segment; posterior emarginations of typical paratergal plates broad and shallow.....*P. abyssinica* (Ferris)

#### NEW SPECIES OF POLYPLAX ENDERLEIN.

Two new species of the genus *Polyplax* are here described. Each shows the apical process of the third antennal segment of the male developed into a strongly recurved, hooklike process. One species comes from the Philippine Islands and the other from China.

#### **Polyplax tarsomydis**, new species.

*Male*.—Forehead greatly reduced, its margin broken up into six very low festoons. Antennae about as long as head, with first segment twice as broad as long and twice as broad as second segment. *Third antennal segment* (fig. 2, *d*) with apical process in the form of a curved, hooklike appendage, the tip of which is formed into four lobes; posterior seta as long as width of segment itself; dorsal seta conspicuous, situated just inside of distal margin; anterior seta (detached?) represented by seta pit; ventroproximal seta conspicuous, situated near anterior margin and about half its length from base of segment; apical seta probably present (its seta pit is present); apical spine absent. Thorax typical of the genus; outer mesothoracic pleurite platelike, touching thoracic spiracle, its seta exceeding

in length the diameter of the thoracic spiracular bulb; inner mesothoracic pleurite larger than outer, its seta equal in length to half the length of the thorax. Sternum with an anterior median process and angulate behind. Sternites and tergites of abdomen well developed, each with a single transverse row of setae. Typical paratergal plates triangular in shape, with cusplike lobes that are minute or even absent, each with a large spiracle situated slightly in front of the center. Ventral paratergal seta on a typical paratergal plate a little shorter than the plate itself, dorsal paratergal seta longer than the paratergal plate. *Genital armature* of the type found in the type species of the genus. Rods of basal plate bent inward near their tips and somewhat Y-shaped, the fork of the Y receiving the side of a paramere on its articulating surface; each paramere continued forward beyond its articulating surface in the form of an out-turned hook, and articulating distally with the base of the large, hooklike pseudopenis.

Length, 0.93 mm.; width, 0.29 mm.

*Type host*.—*Tarsomys apoensis*.

*Type locality*.—Mindanao, Philippine Islands.

*Type (holotype)*.—Cat. No. 44904, U. S. N. M.

Described from a single male, taken from the skin of the type host, a member of the rodent family Muridae, which was taken at the type locality.

The third antennal segment of the male is of unusual shape and easily identifies the species.

### ***Polyplax dentaticornis*, new species.**

*Male*.—Forehead practically obliterated, its very broadly rounded margin being practically continuous with the front margins of the first antennal segments. Antennae about as long as the head; first antennal segment slightly broader than long and twice as broad as second segment. *Third antennal segment* (fig. 2, c) greatly modified, the apical process including most of it and formed into a long, curved, hornlike process which is trifurcate distally; posterior seta situated on short posterior margin, in length equal to width of segment; dorsal seta about half as long as posterior seta, situated centrally; anterior seta, ventroproximal seta, and ventrodistal seta minute and all situated on anterior margin; apical seta absent. Apical spine absent, but along the dorsal side of the incurved distal margin is a sharp, spinelike tubercle. Temples not swollen. Thorax slightly broader than long; outer mesothoracic pleurite almost contiguous with thoracic spiracle; its seta very short; inner mesothoracic pleurite overlapped by outer; its seta very large, reaching beyond posterior margin of thorax. Sternum without anterior median process, lateral margins almost parallel. Abdominal sternites and tergites moderately well sclerotized, each with but one transverse row of setae. Typical paratergal plates with small, serrate lobes, and with spiracle situated near the center; paratergal setae stout, some of them spinelike. *Genital armature* typical for the subgenus; each rod of basal plate separated from lateral margin for most of its length by a suture, angularly emarginate on its mesodistal articulating surface; each paramere articulating with rod of basal plate for about two-

thirds its length and extending forward beyond articulation as a straight process; pseudopenis a large, hooklike structure.

Length, 0.91 mm.; width, 0.30 mm.

*Lust nymph.*—Quiescent nymph, with male forming inside, showing no enlargement of third antennal segment; first antennal segment smaller in proportion to the others than in male. Dorsal abdominal setae two to a segment, arranged in two paramedian longitudinal rows; ventral abdominal setae of similar arrangement. Paratergal plates poorly sclerotized.

Length, 0.80 mm.; width, 0.28 mm.

*Type host.*—*Cricetulus andersoni*.

*Type locality.*—Shansi, China.

*Type (holotype).*—Cat. No. 44905, U. S. N. M.

Described from a male (holotype) and a last nymph taken from skin (U. S. N. M. 172610) of type host, a murid of the subfamily Cricetinae, collected at the type locality.

In this species the apical process of the third antennal segment of the male reaches its extreme development, and the setae of the third segment undergo their greatest reduction in size.

#### KEY TO THE SPECIES OF *Eremophthirius* GLINKIEWICZ.

1. Paratergal plates long, the lobes of one plate overlapping the base of the following plate; paratergal setae very long, on typical abdominal segments as long as or longer than the paratergal plates..... 2
 

Paratergal plates shorter, the lobes of one plate not overlapping the base of the following plate; paratergal setae shorter, usually not so long as the paratergal plates..... 3
2. Temporal lobes evenly rounded..... *E. praecisa* (Neumann)
 

Temporal lobes not evenly rounded, but with postantennal angles and posterolateral angles well developed.....

*E. stephensi* (Christophers and Newstead)
3. Some lobes of paratergal plates with serrate margins and very conspicuous..... *E. taterae* (Ferris)
 

No lobe of paratergal plates conspicuous and none with serrate margins..... 4
4. Typical paratergal plates with distinct cusplike lobes..... 5
 

Typical paratergal plates with vestigial lobes; apical process of third antennal segment of male almost straight, longer than the segment proper, with apical seta absent and apical hook only slightly recurved and not turned upward.....

*E. eropepli*, new species
5. Each typical abdominal segment of male with two transverse rows of setae, the setae of the first row much shorter than those of the other row..... *E. biseriata* (Ferris)
 

Each typical abdominal segment of male with but a single transverse row of setae..... *E. wernerii* Glinkiewicz

A NEW SPECIES OF EREMOPHTHIRIUS GLINKIEWICZ.

One of the six species of *Eremophthirius* is new. It comes from a murid host of the subfamily Murinae, which was taken in Celebes.

***Eremophthirius eroepli*, new species.**

*Male*.—Forehead but little developed, its margin broken up into four low festoons. Antennae slightly longer than the width of the head; first segment about as broad as long; second segment almost as long as first but only about one-half as broad. *Third antennal segment* (fig. 2, b) with a very long, straight apical process, this being about twice as long as the segment proper; posterior seta not so long as width of segment, situated at posterodistal corner of segment; dorsal seta somewhat smaller than posterior, situated at about the middle of the segment; anterior seta situated just back of front margin of segment and about half way from the base of the same to the tip of the apical process; ventroproximal seta situated at distance equal to about two-thirds its length from the base of the segment and the front margin of the same; ventrodistal seta situated slightly distad of the anterior seta; apical spine short, straight, spinelike; apical hook slightly recurved, not bent upward. Temporal lobes broadly rounded. Thorax broader than long; outer mesothoracic pleurite a crescentic ridge, which is fused with the inner mesothoracic pleurite and projects over and above the front part of the thoracic spiracle; outer mesothoracic pleural seta spinelike, situated directly above the thoracic spiracle; inner mesothoracic pleurite a sclerotized ridge; inner mesothoracic pleural seta about two and a half times as long as the outer. Typical paratergal plates with very small, vestigial, simple lobes; setae on typical paratergal plates somewhat spinelike. Tergal setae arranged in a single transverse row on each abdominal segment, variable in size. *Genital armature of male* as follows: Basal plate reaching forward to middle of sixth abdominal segment, lateral margins incurved, rods separated from lateral margins for much of their length by a suture; parameres very short, each articulating distally with base of pseudopenis, below with ventral endomere, and extending as a small straight process; posterior endomere formed into a large, hooklike pseudopenis with a broad base.

Length, 1.03 mm.; width, 0.45 mm.

*Female*.—Forehead more protruding than in the male. First antennal segment longer than broad and only about one and a half times as broad as second segment; third antennal segment as broad as long and longer than the fourth. Inner seta of each genital tuft distinctly spinelike and somewhat shorter than the others.

Length, 1.42 mm.; width, 0.49 mm.

*Type host*.—*Eropeplus canus*.

*Type locality*.—Celebes.

*Type slide (cotypes)*.—Cat. No. 44906, U. S. N. M.

Described from two males and two females taken from the skin (U. S. N. M. 219711) of the type host, which was collected at the type locality.

This species is nearest *E. werner* Glinkiewicz, but differs from the latter in the shape of the paratergal plates and in some other characters.

POSTSCRIPT.

The species described by Professor G. F. Ferris of Stanford University as *Polyplax borealis*, new species,<sup>1</sup> is as he suspected only a synonym of my *Polyplax alaskensis*. His beautiful illustrations of this circumpolar louse are most welcome.

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<sup>1</sup>Parasitology, Vol. XXV, p. 127.









